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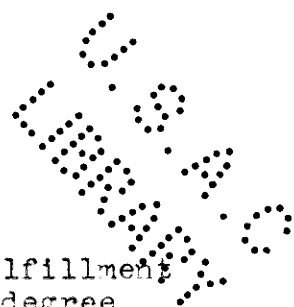


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A GUIDE TO BE USED IN EVALUATING AUDIO-VISUAL AIDS
FOR USE IN THE TEACHING OF INDUSTRIAL ARTS
IN THE JUNIOR HIGH SCHOOLS OF UTAH

by

Dan W. Swenson



A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Industrial Education

1949

UTAH STATE AGRICULTURAL COLLEGE
Logan, Utah

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Dan H. Swenson

Logan, Utah
May 1949

TABLE OF CONTENTS

Introduction	1
Statement of the Problem	5
Delimitations	6
Method of Attack	7
Distribution of Replies to Questionnaire . . .	9
Review of Literature	10
Presentation of Data	15
Introducing Students to a New Subject Area . .	17
Audio-Visual Aids Recommended for Teaching Basic Skills	29
Audio-Visual Aids Recommended for Teaching Related Information	38
Audio-Visual Aids Recommended for Teaching Tool Safety	44
General Summary and Conclusions	50
Appendix A	58
Literature Cited	62
Appendix B	63
. Bibliography for Appendix B	106

I N T R O D U C T I O N

INTRODUCTION

To find the beginning of the use of audio-visual aids in the teaching of industrial arts is difficult, if not impossible. The very nature of the work makes the use of audio-visual teaching methods absolutely indispensable. Long before the term "audio-visual aids" had been coined and before any attention had been given to the teaching method, as such, teachers of industrial arts were making use of the demonstration, the model, the exhibit, and many other teaching devices since included in the scope of the meaning of audio-visual teaching aids.

It would be hard indeed to imagine how a teacher could effectively teach anyone how to do something with his hands without showing him how to do it--without a demonstration. One can imagine how nearly impossible it would be to teach someone how to tie the underwriter's knot, for example, by telling alone and how much easier it would be for the student to learn if the telling were accompanied by a demonstration.

In the light of the foregoing concept, it seems safe to say that the teachers of manual pursuits, or manipulative skills were among the first to make use of audio-visual methods in teaching. Surely the use of the demonstration is as old as the organized teaching of any of the manual arts.

The term "audio-visual aids" usually calls to mind the motion picture or some other form of picture projected on the screen--such as the slide, the film strip, or an illustration from a textbook thrown on the screen by the opaque projector.

On the other hand, such devices as the demonstration and the use of blackboard illustration are so commonly used that teachers sometimes fail to think of them as visual aids.

The writer chooses to include in his definition of "audio-visual aids" many things other than projected pictures, and in so doing is in complete agreement with recognized authorities in the field. Among the devices included in the writer's definition are: motion pictures, still pictures, field trips, models and mock-ups, demonstrations, lectures, charts and graphs, diagrams, and animated drawings.

At this point it might be well to consider some of the ways in which the use of audio-visual materials can help in the achievement of some of the objectives of industrial arts education.

The aims and objectives of industrial arts education, as outlined by the Utah State Department of Public Instruction, will serve as a guide in evaluating the contribution that audio-visual aids can make in helping the industrial arts teacher achieve his goal. (1: 12)

It is apparent that to the extent that audio-visual teaching methods make all teaching more effective, they help in the attainment of these aims; however, they definitely aid in the achievement of certain ones of the above-mentioned objectives, and these are the ones which will be considered specifically.

1. To develop in the student a knowledge and appreciation of industry and industrial life. There was a time when children grew up with an opportunity to observe production at first hand.

Although there was some specialization, every child could see with his own eyes the work of the blacksmith, the carpenter, the cobbler, etc. Even the manufacture of food and clothing was a household activity. But modern civilization affords no such opportunity for its youth. The city dweller is apt to be ignorant of the methods of food production and the activities of the farm. Although he might live in the heart of a manufacturing center, chances are he does not even have a clear picture of the working of a factory. The farm boy, living far from the centers of industry, usually has no idea of the complexities of the manufacturing business.

If these young people are to develop a knowledge and appreciation of industry and industrial life as a part of their schooling, the use of the motion picture, the field trip, and other visual materials can be, and is, an invaluable help. The motion picture can take the farm boy into the factories of the city and show him the importance of and give him an appreciation for industry which he could never get through telling alone.

2. To develop the student's skill and manipulative ability in using the common tools and machines. To achieve this objective, extensive use is made of the demonstration where the student is shown the correct procedure. Then through using the "contrived experience," the student is given a chance to practice what he has been shown how to do--one of the most effective learning methods there is--"learning by doing."

3. To develop the student's knowledge and appreciation

of good workmanship and design. By making use of exhibits, the teacher is able to keep before the students examples of good workmanship and design, and thus stimulate them to better workmanship. The trend in the past seems to have been to place the emphasis on good workmanship to the extent that design has been given too little attention. It is obviously possible to have excellent workmanship and poor design, or good design poorly executed. Good examples of design and workmanship kept before the student in the form of exhibits will help him gain an appreciation of these important aspects of the job.

4. To provide the student with experiences which will be helpful to him as he selects, prepares for, enters, and advances in his occupation. The whole program of industrial arts training is composed of a series of direct, purposeful experiences and contrived experiences which help the student to choose and prepare himself for his occupation. Through the use of visual teaching materials, the teacher is able to widen the range of these experiences. The motion picture, for example, provides the student with vicarious experiences which he likely would be unable to get in the real form. Insofar as audio-visual aids are able to increase the range and number of experiences provided for the student, they help to fulfill this aim of industrial arts education.

5. To develop the student's ability to interpret graphic presentations and use them as a means of self-expression. The visual aid most helpful in the attainment of this objective is probably the one known as the visual symbol. A clear-cut drawing or blueprint, when used in conjunction with photographs is

easily interpreted by the young student. An effective means of making graphic presentations meaningful to the student will be considered in a latter part of this paper.

There are many other accepted objectives of industrial arts education, but those mentioned here are the ones that seem to be best attained with the help of audio-visual aids.

There are numerous ways in which the use of audio-visual aids enrich the industrial arts curriculum, and a teacher is justified in making use of any and all of these materials in planning his course of study as long as their use makes the teaching more effective. On the other hand, a teacher is never justified in using these devices for the purpose of relieving himself of work and responsibility when their use makes no real contribution to the teaching. There is, sometimes, a tendency on the part of the student to regard the classroom movie as a "show" and a willingness on the part of the teacher to let the motion picture, or other visual aid take his place. The audio-visual aids, as their name implies, only aid the teacher and should not be a substitute for him.

THE PROBLEM

Authorities are in general agreement that visual aids are valuable as a means of making instruction more vital and meaningful. However, assuming that visual teaching aids are no different than other teaching devices, such as books and teachers, in that all grades, ranging in quality from extremely good to very poor are available, it becomes apparent that the problem of evaluating audio-visual materials is significant.

Not only is the teacher faced with the problem of separating the good from the poor, but also with the problem of choosing from among the well-prepared, available teaching aids, those which are most effective in presenting the material of each subject matter area for which he is responsible. It is with the latter problem that this study is concerned.

The objective of this study is to ascertain which one or two, or more, of the many audio-visual aids available to industrial arts teachers, help most to make the subject matter vital and meaningful to the students in each of the subject matter areas included in the industrial arts programs of the junior high schools of Utah.

Thus, the problem resolves itself as follows:

In each of the subject matter areas included in the industrial arts programs of the junior high schools of Utah, which audio-visual teaching aids can contribute most to making the material in those areas vital and meaningful in the teaching process?

DELIMITATIONS

For the purpose of this investigation the writer has chosen to deal with the industrial arts program of the Utah junior high schools. There seems to be more unity among the programs of the schools throughout the state on the junior high school level than there is in the high schools or colleges. That is, an effort is being made to have the junior high schools of the state follow, quite closely, the program that is outlined by the State Department of Public Instruction. For this reason it is felt that the study will probably be of greater

value to more teachers than it would be had it dealt with the industrial arts programs at any other school level.

The purpose of this study is not to evaluate existing audio-visual aids, nor to justify their use; but rather the purpose is to learn which types of audio-visual aids to instruction have been found to be most useful for specific subject matter areas.

The writer believes that an authoritative guide to help the teacher choose the type of teaching aid which is most likely to be effective will be of greatest value to him. This belief is the out-growth of the assumption that once the most effective type of visual aid has been established, the teacher will have little difficulty choosing those aids which are best prepared from among the ones available to him.

METHOD OF ATTACK

Several careful studies have been made dealing with the use of audio-visual aids in the teaching of industrial arts. A number of these surveys are cited in this work and they form one source of information. An analysis of these studies supports the conclusions drawn in this study.

Inasmuch as no previous study dealing with the evaluation of general types of audio-visual aids was found, it was felt that another source of information based on original inquiry was necessary. The writer feels that the considered opinion of a group of experts actively engaged in the field of industrial education constitutes the best source for the information being sought. Therefore, questionnaires were sent to

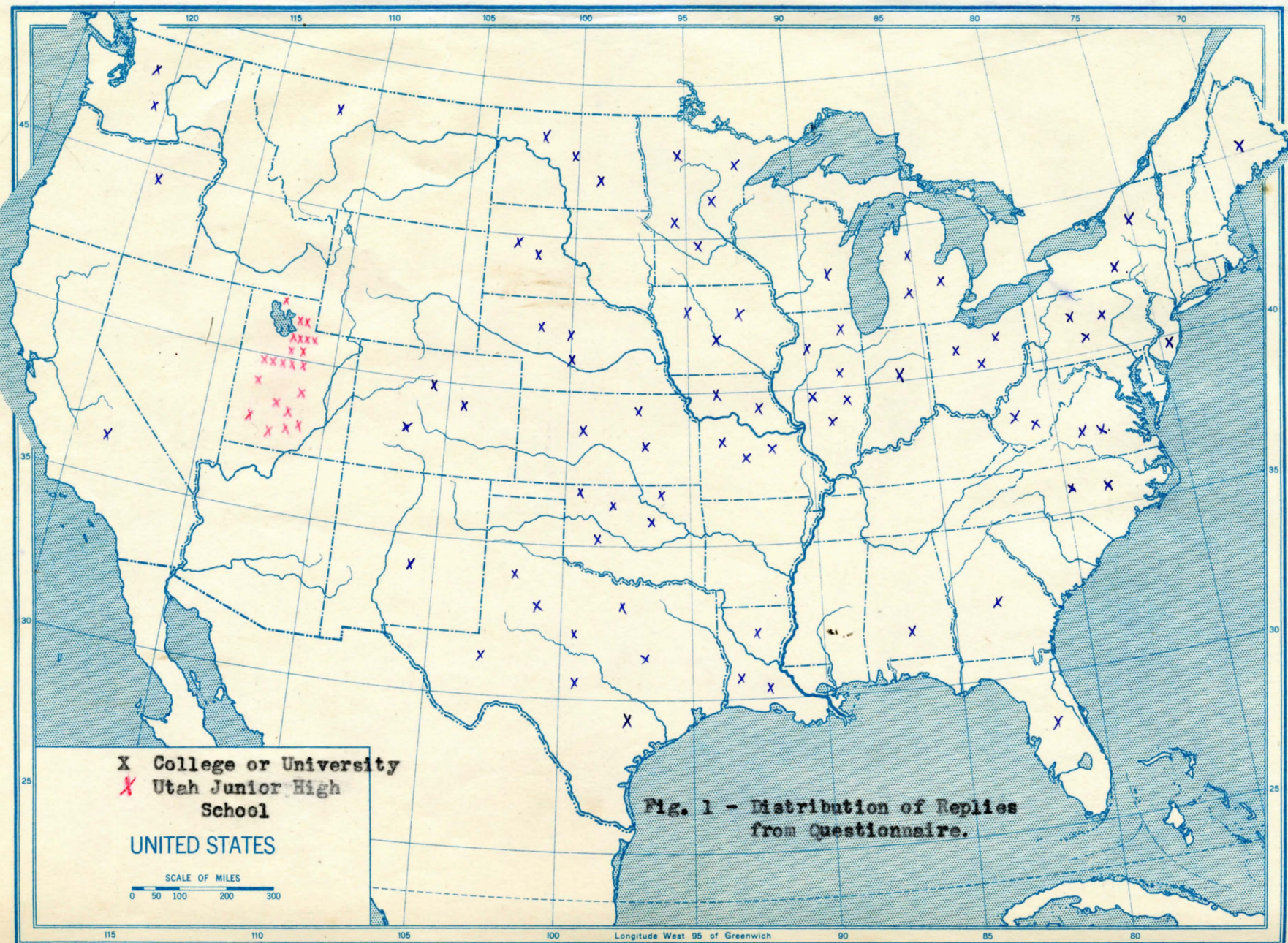
the heads of industrial education departments in most of the nation's colleges having industrial arts teacher training programs, and also to teachers actively engaged in the teaching of industrial arts in the junior high schools of Utah.

A copy of the questionnaire can be found in Appendix A. Of the 192 questionnaires sent out, 112 or 58.3 per cent were returned. One hundred four of these, or 54.7 per cent of the total were usable. Eight of the replies were not usable because the instructions were not followed closely enough to permit tabulation of the responses. Of the total of 104 questionnaires which were returned and usable in the investigation, eighty were from colleges. This represents fifty-six per cent of the 141 questionnaires which were sent to colleges. Fifty-one questionnaires were sent to Utah junior high schools. Of this number twenty-four, or forty-seven per cent, were returned and used in the study.

The distribution of replies from colleges is illustrated in Figure 1 (page 9).

As can be seen from the foregoing, the replies comprise two groups: (1) those coming from people engaged in the training of industrial arts teachers; and (2) those coming from teachers actively engaged in the industrial arts programs of the Utah junior high schools.

It is felt that the opinions of both these groups are significant--the former because the people engaged in teacher training are constantly seeking for new and better ways to make teaching effective, and the latter because the teachers who are teaching the subject matter with which this investigation is concerned are in the best position to observe the



results and effectiveness of the teaching aids under consideration.

REVIEW OF LITERATURE

Of the many studies which have been made in the field of audio-visual education, there are relatively few that deal with the use of audio-visual methods of teaching in the field of industrial arts. Among the studies, concerned with the use of audio-visual aids in the teaching of industrial subjects that the writer has been able to find, none have had the same objective as this study, i.e., to determine the type or types of visual aids that are most effective for each particular subject matter area. But rather, each has justified the use of audio-visual teaching aids and shown that instruction can be made more meaningful through their use.

Since the above-mentioned studies do attempt to solve some of the problems which are specifically the problems of industrial education, and since the work done by earlier investigators forms the "ground work" for present investigation, it is felt that a review of some of the studies made in the past is a valuable addition to the present work.

Several studies have been planned and carried out to determine the efficacy and place of motion pictures in school instruction. Among these, and probably the most notable, are the studies made by Ben D. Wood and Frank N. Freeman, and also those made at the University of Chicago under the direction of Freeman.

Following are brief accounts of the two studies.

The Wood and Freeman Study. (3) The study carried out by Wood and Freeman in the fields of general science and geography described in their book "Motion Pictures in the Classroom," is outstanding from the standpoint of education.

Films covering a select group of topics were especially prepared for the study. Approximately 11,000 children from twelve widely distributed cities of the United States participated. Two groups were selected--a control group to whom the pictures were not shown, and an experimental group who received instruction through the motion pictures. As a result of this study the motion picture groups were found to have acquired more information, and were better able to use this information in original situations.

The University of Chicago Studies. (4) This is a series of studies made at the University of Chicago under the direction of Frank W. Freeman for the purpose of studying educational motion pictures. Comparisons were made between motion picture films and lantern slides, using identical material, with and without spoken comment. In other cases, sub-titles were shown on the slides. The motion pictures were shown twice and compared with films and slides shown together, and with a lengthened presentation of slides, with oral discussion, and with and without charts and pictures.

In other studies charts and still pictures were compared with films. In still another study the comparative effectiveness of films when used for instruction and when used as a

summary to a lesson was investigated. All of the films used in the studies were definitely educational and all slides and pictures were made from the films. Comparable groups were used in each study.

The principal conclusions reached as a result of the University of Chicago Studies are: (1) Pictures seem to be most valuable when the material is unfamiliar to the student. (2) The value of motion pictures lies in their ability to furnish a vicarious experience. (3) On the whole there is a smaller percentage of memory loss when films are used. (4) It is probably desirable to have motion picture films in small units.

The Raymond Wesley Arnold Study. (2) A study was made by Raymond Wesley Arnold at the Agricultural and Mechanical College of Texas in 1932 to determine the effectiveness of motion pictures in teaching industrial arts in the junior high school.

In his study Arnold set up an experiment in which three industrial films were used and in which the results obtained by teaching three groups of students the same subject matter by three different methods were compared.

Three groups of students were chosen, with particular attention paid to the selection of homogeneous groups. Three types of instruction were employed: instruction by motion picture; instruction by the teacher lecturing; and instruction by having the students study the lesson from printed matter.

The first of these was essentially a pictorial presentation, the pupils watching the film in silence. In the second method the teacher presented the instruction, based on the content of the film. In the third type of instruction the

students studied a printed lesson formulated from the content of the motion picture.

A rotation plan was followed in this experiment involving progressive shifts for each of the groups. In this way each group participated in each type of instruction. The students were given a test on the lesson material presented immediately after its presentation. All of the procedures in this experiment were "accurately timed and controlled in order to eliminate variables." (2: 19)

The test scores in this experiment indicated that instruction by motion picture was more effective than instruction by either of the other methods. The variation in scores was not, however, the same for each of the units in this experiment. This was probably due to the fact that the material in each of the units was not equally technical in nature.

Although this study was not undertaken to evaluate the effectiveness of a motion picture as an aid to learning in relation to different types of subject matter, the results of the experiment would seem to indicate that:

. . . a greater gain in learning is to be had, through the use of the motion picture when the material being taught is of such a nature that explanatory details contained in printed matter would have to be converted into sensory imagery before they could be understood by the teacher.

Thus, a teacher would do well to make use of the motion picture in presenting a lesson in which processes and tools, unknown to the pupils are considered for the first time. A lesson which makes mention of articles and procedures wholly unfamiliar to the students will be little more than a play of words unless some means is utilized to convert names into sensory images. (2: 21)

The Harold E. Thompson Study. (7) Thompson conducted a

study at Penn State College in 1935, to determine the extent to which visual aids were used in teaching industrial arts and related subjects in the industrial schools and departments of the nation. His study did, however, not attempt to evaluate the various visual aids as related to specific subject matter areas.

Thompson found in his investigation, that the most popular visual aid used in the districts embraced by his study was the motion picture, with the blackboard and inspection trip ranking second and third respectively.

The fact that approximately 87 percent of the districts making use of the inspection trip for the acquisition of supplemental information indicates that one of the most important of the visual-sensory aids is being taken advantage of. (7: 36)

Thompson concluded that the selection of visual material should rest with the teacher.

The R. W. Rogers Study. (6) Rogers conducted a survey to determine what visual aids were being used in the teaching of woodwork in the United States. His findings showed:

That: the aids used in teaching related information in the order of their popularity were, 1. textbooks, 2. models, 3. demonstrated lectures, 4. charts, 5. exhibits, 6. photographs, 7. information sheets, 8. excursions, 9. motion pictures, 10. slides, and 11. graphs. (6: 51)

The order of popularity of the aids used in teaching technical information was:

1. Demonstration on the job to the group; 2. demonstration on the job to the individual; 3. models; 4. exhibits; 5. textbooks; 6. charts; 7. demonstrated lectures; 8. student demonstration; 9. photographs; 10. excursions; 11. motion pictures; 12. graphs. (6: 54)

In considering the outcome of the above-mentioned study, it must be remembered that Rogers was endeavoring to learn only which visual aids were being used and not which were considered to be most effective. Because a thing is being done, it does not necessarily follow that that is the best thing to do.

PRESENTATION OF DATA

The teachers to whom the questionnaires were sent were requested to name the audio-visual aids which, in their opinion, contributed most to effective teaching. Blanks were provided for their choices (in order of effectiveness) from one to nine. In considering the results it was found that a large percentage of those responding to the questionnaire made only three or four choices instead of the nine provided for in the form. The fact that so many of the responders limited their selection to the three or four "best" teaching aids, indicates that beyond a third or fourth choice it was difficult to rank the others with any degree of significance. The tabulation of the information gathered in the questionnaire showed such a wide scattering that the answers beyond the fourth choice were no longer felt to be of great significance.

In order to keep the study well within the bounds of the significant results, it was felt advisable to accept only the first three choices for evaluation.

This is exactly what one would expect when the nature of the different subject matter areas, and the different phases of the instructional program is taken into consideration. That is,

it becomes apparent that any attempt to give a rank to those teaching aids that obviously are not suited to a particular phase of instruction, becomes little more than a guess.

Therefore, the writer felt that only the first, second, and third choices were of sufficient significance to be included in the determination of the results of this study.

It was decided that final evaluation of the various teaching aids should depend upon the weighting of the responses. Merely to consider the aid having the largest number of votes for first, second, or third choice would not give a true picture of the response. After careful consideration it was decided that a 5, 3, 1 weighting for first, second, and third choice would be satisfactory to give a spread between the values of such a first, second, or third choice. The writer recognizes the fact that this is an arbitrary weighting scheme but feels that it is quite satisfactory for the interpretation of the results of this study.

The bar graph was chosen as the means of graphical representation of the data. Since the data does not represent a continuous function, it is felt that this is the best device for visual presentation of the questionnaire responses.

INTRODUCING THE STUDENTS TO A NEW SUBJECT AREA

When introducing a new subject matter area to his students, or when introducing some new phase of a subject within the area, a teacher is always faced with the problem of finding some means through which he can arouse and capture the interest of his class. When the teacher has created within the students a "real" interest in the subject to be presented he has "set the stage" for learning.

The development of interest is one of the greatest values of visual aids in school achievement. Visual aids provide a type of concrete experience which is understandable to the school pupil. To experience visually he does not have to be a good reader, or to have developed a vast technical vocabulary. Experiencing through pictorial material provides a certain easily accessible fund of information within the range of the pupil's ability. At the same time, this experience opens to him a far greater field of experience which he has yet to acquire. Having learned a little he wants to know more. New problems grow in his mind. They are his problems; the need to learn their solution arises within him. Having arrived at their solution he has made an achievement. Out of success arises a state of satisfaction and a feeling of confidence in his ability to find out and to know. This, in turn, leads to more activity in the field of knowing and problem solving. This whole pattern of reaction, vital to classroom success and happiness just as much as to these same states of life outside the classroom, is very inadequately termed interest. (5: 119)

When the student's interest has been aroused, learning inevitably follows.

Since "attention getting" is such an important factor in successfully introducing a new subject to students, it seems safe to assume that the audio-visual aids recommended in the responses to the questionnaire dealing with the introduction of new subject matter areas, function chiefly as interest-arousing devices.

Figures 2 to 6 represent, graphically, the recommendations of those teachers who responded to the questionnaire. The bars of the graphs are divided into two parts: (1) the red portion representing the responses from Utah junior high school teachers, and (2) the black portion representing the opinion of the people in the industrial education departments of the colleges to which questionnaires were sent. The figure at the top of each column represents the weighted valuation of the replies to the questionnaire.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING

INTRODUCTORY MATERIAL IN WOODWORK AND PAINTING

In the subject area of "Woodwork and Painting," motion pictures and demonstrations were recommended as the most valuable visual aids to use in the presentation of introductory material. Motion pictures ranked first with a valuation of 152 and demonstration second with an almost identical valuation of 151. Field trips and models and mock-ups follow closely in popularity with scores of 133 and 131. The writer feels that all four of these devices were given relatively high ranking because of their effectiveness in getting attention. The motion picture and the field trip stimulate interest by giving the student an opportunity to see for himself the importance of woodwork and wood finishing in the world in which he lives. These devices together with the demonstrations of skill and the examples of workmanship which the instructor presents to him, all help to arouse in the student a desire for creative expression. Still pictures and lecture

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings.

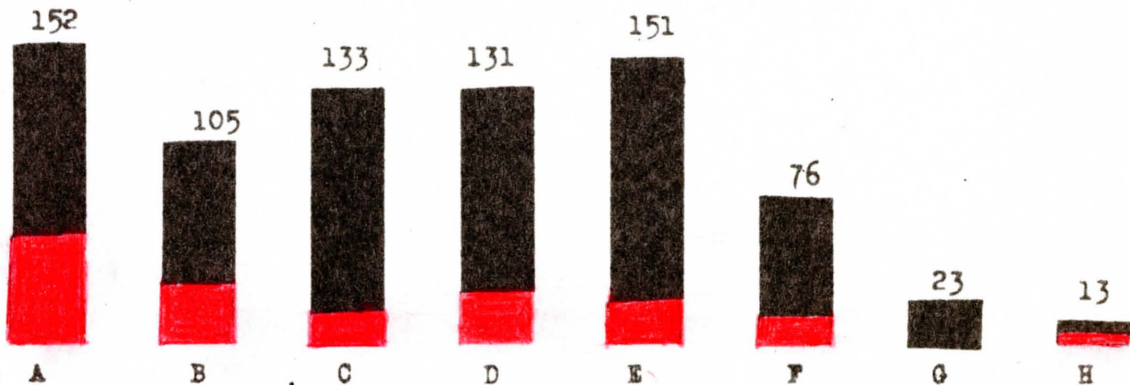


Figure 2. Audio-visual aids recommended for teaching introductory material in woodwork and painting.

when used for the introduction of new material appear to be less effective than might be the case when they are used in connection with some other phase of instruction. Charts and graphs are apparently considered to be of slight value in the introduction of woodwork and painting.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING INTRODUCTORY MATERIAL IN DRAWING

The motion picture was rated as far the most effective aid to the teacher in introducing the subject of drawing to students on the junior high school level, with a valuation of 272, more than twice that of the second ranking aid in this phase of instruction which was the demonstration with a valuation of 114. The motion picture received a recommendation which would give it the status of a near necessity in introducing the subject of drawing.

Still pictures, field trips, models and mock-ups, and demonstrations all received nearly equal recognition as contributors to the successful presentation of introductory material in drawing. Models and mock-ups and demonstrations were ranked second and third with valuations of 114 and 113, respectively; and still pictures and field trips were placed fourth and fifth, in order of value, with valuations of 103 and 101. Lectures, charts, and graphs and animated drawings are apparently felt to be of minor importance in introducing junior high school students to the subject matter area of drawing.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers, the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

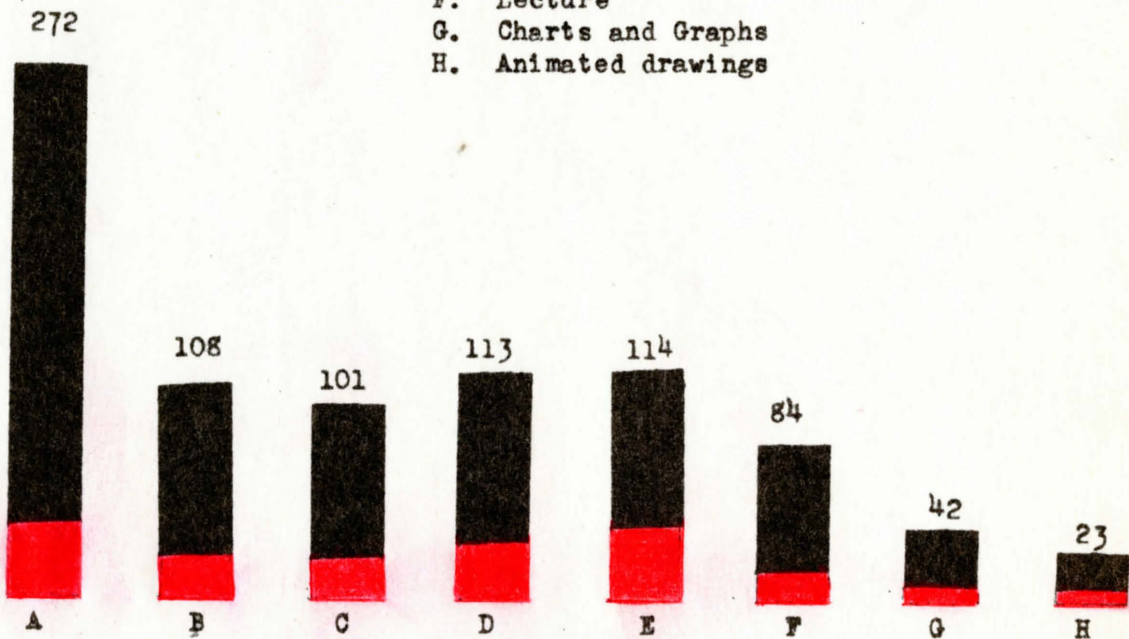


Figure 3. Audio-visual aids recommended for teaching introductory material in drawing.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

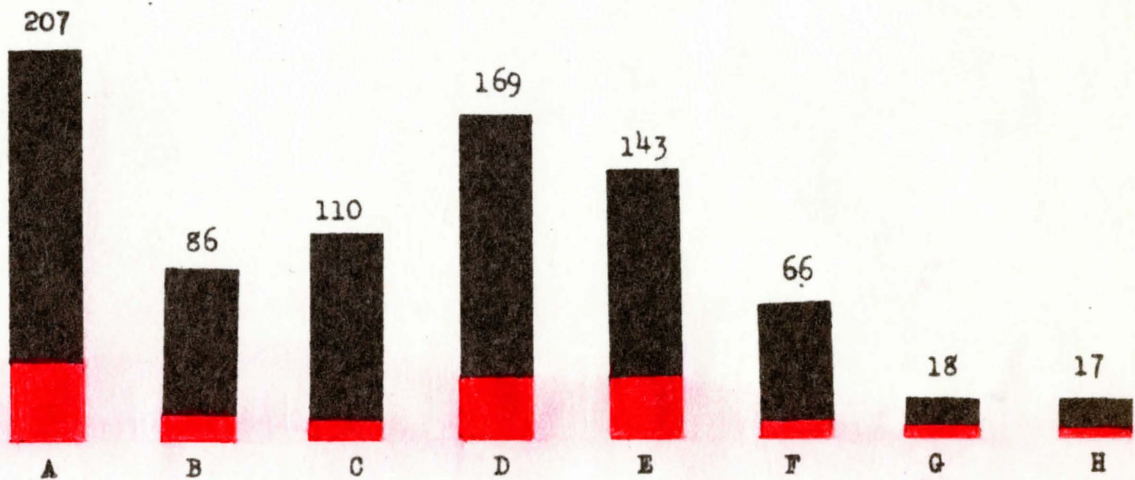


Figure 4. Audio-visual aids recommended for teaching introductory material in craft work.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING
INTRODUCTORY MATERIAL IN CRAFTWORK

The responses to the questionnaire seem to indicate that interest in craftwork among junior high school students can best be generated when motion pictures and examples of craftwork are used in connection with classroom instruction.

Motion pictures were given first choice by the teachers answering questionnaires, with models and mock-ups as a close second choice. The weighted valuations for the two aids were 207 and 169. Here, again apparently, interest is created by giving the students a look into the unknown. By letting them see what can be done and is being done in a field that has hitherto been foreign to them, and by making them feel that they, too, can learn to do the things they have seen in picture and by demonstration.

Of less importance but still valuable as aids to the teacher in teaching this phase of industrial arts are field trips, lectures, and still pictures. These teaching aids were given weighted valuations of 110, 66, and 86 respectively, by the respondents to the questionnaire. Once again charts and graphs and animated drawings seem to be of little help in presenting the introduction to a subject matter area.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING INTRODUCTORY
MATERIAL IN GENERAL METALS

In the opinion of those answering the questionnaire, motion pictures contribute most to the successful presentation of the introduction to a course in general metals. Field

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups ;
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings.

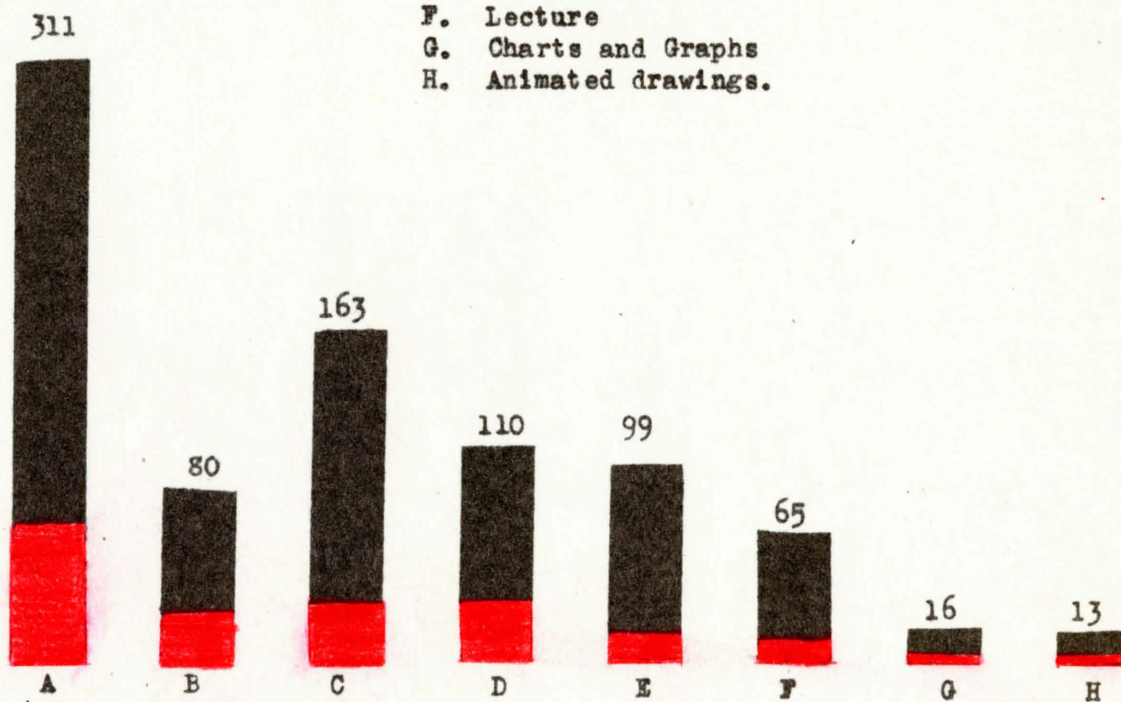


Figure 5. Audio-visual aids recommended for teaching introductory material in general metals.

trips are rated second with a weighted valuation of 163, just a little more than half of the 311 given to motion pictures. Although both devices serve to generate interest by giving the student an opportunity to see the part that is played by metals in the complex society in which he lives, it seems likely that motion pictures received first choice because of the ability of the "movie" to take the student to far away and otherwise inaccessible places. In some localities, such as cities in industrial centers, the field trip would, in all probability, serve the same purpose better than would the motion picture.

Models and mock-ups, demonstrations and still pictures were shown to be of definitely secondary importance in the presentation of introductory material in general metals. The weighted valuations of these three teaching aids were found to be as follows: Models and mock-ups 110, demonstrations ninety-nine, and still pictures eighty. Lectures were rated sixty-five and animated drawings and charts and graphs received valuations of only thirteen and sixteen, respectively.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING INTRODUCTORY MATERIAL IN GENERAL ELECTRICITY

A course in general electricity taught to junior high school students must, of course, be kept at an elementary level. The experiments and projects should be simple and yet teach the fundamental principles in such a way that the student gains an appreciation for the tremendous part that is played in the modern world by electricity.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

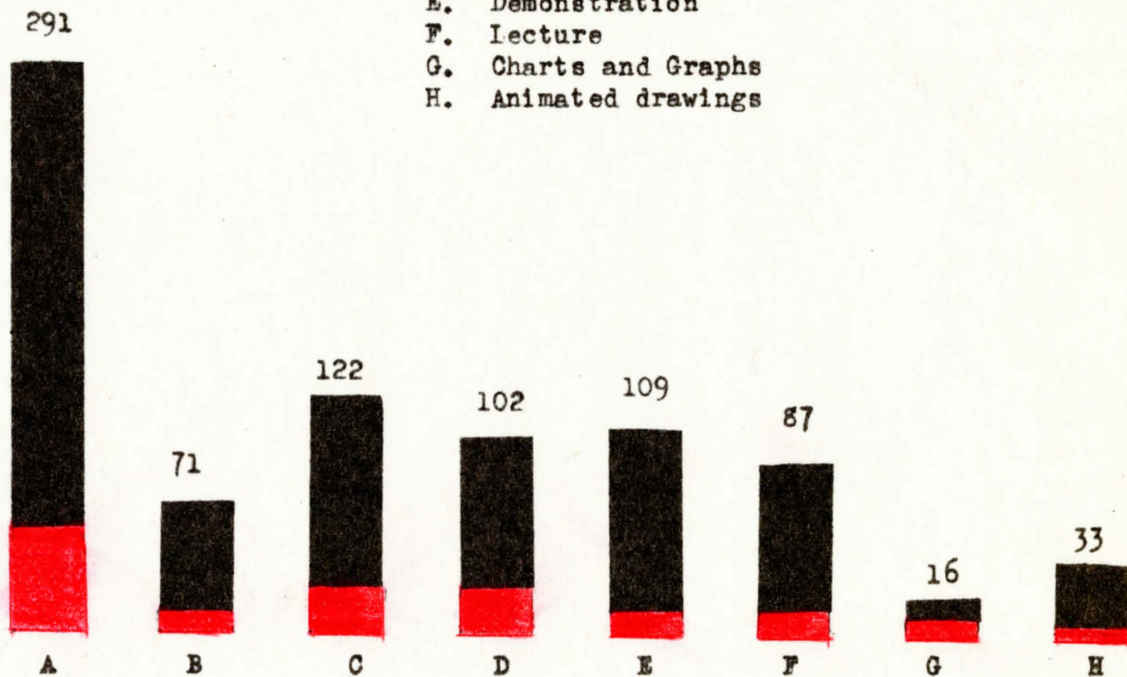


Figure 6. Audio-visual aids recommended for teaching introductory material in general electricity.

The teachers answering the questionnaire have chosen the motion picture as the teaching aid that contributes most to the successful introduction of a course in general electricity. It seems likely that motion pictures are felt to be most valuable in this capacity because in the field of electricity there are so many interesting applications that can "catch" the interest of the students, but which are quite inaccessible to them by any means other than the motion picture. That is, one teacher may have his class in a locality where a field trip would give his class an opportunity to see several of the needs of man being served through the use of electricity. Many other teachers will be situated in places which provide few such opportunities. Probably no teacher will be so fortunately located as to make it possible for his class to see all of the electrical applications, first hand, that he would like to have them see, even if there were time enough for such an extended field trip. One of the chief advantages of the motion picture as a visual aid to teaching, whether it be used to present an introduction or for any other phase of instruction, is the ability it possesses to compress time and space so that a wide variety of visual experiences may be presented to the class in the short time allotted to one class period.

Demonstrations, field trips, and models and mock-ups were given quite similar values by those responding to the questionnaire. Their weighted valuations are as follows: field trip 122, demonstrations 109, and models and mock-ups 102. These three teaching aids can almost be grouped together as second

choice as an aid to introducing the junior high school class to the subject matter area of general electricity. Animated drawings and charts and graphs, with weighted scores of thirty-three and fifteen are considered to be least useful in introducing this subject matter area. Lecture and still pictures with valuations of eighty-seven and seventy-one were the fifth and sixth choices.

If the teacher were choosing a single audio-visual aid to help him introduce his students to a new field or area and give them an over-view of its possibilities, the motion picture would probably be his best choice. In each of the five subject matter areas under consideration in this study, the motion picture was given first choice as the visual aid contributing most to the successful presentation of introductory material.

Examination of the accompanying charts reveals that, in general, the recommendations for one subject matter area are the same as those for each of the others. That is, motion pictures were found to be most popular in every area, while field trips, demonstration, and models and mock-ups vied for second choice in the various areas, falling for the most part fairly close together on the scale of popularity.

Raymond Wesley Arnold found in his study concerning the effectiveness of motion pictures, that they were most effective when used to aid in the presentation of material wholly unfamiliar to the students.

Thus, a teacher would do well to make use of the motion picture in presenting a lesson in which processes and tools, unknown to the pupils are considered for the first time. A lesson which makes mention of articles and procedures wholly unfamiliar to the students will be little more than a play of words unless some means is utilized to convert names into sensory images.(2:39)

There are between three and four times as many college teachers represented in the results of the study, as there are junior high school teachers. Keeping this in mind it becomes apparent from an examination of the bar graphs that the opinions of both groups are in general agreement in their recommendations. The slight differences that do exist are felt to be of no particular significance.

AUDIO-VISUAL AIDS RECOMMENDED FOR THE TEACHING OF BASIC SKILLS

The teaching of skills differs from the teaching of academic subject matter in that the learning of skills involves manipulative ability in addition to the mental processes comprising academic learning.

With this basic difference in mind it becomes clear that the audio-visual aids that will be most helpful in teaching basic skills are those that will help to show the student how to do the job. The whole process of teaching basic skills is largely a process of showing how. When basic skills are to be taught the teacher must also keep in mind the necessity for maintaining the high level of interest which he has tried to establish in his introduction to the area. For without this interest, learning will be slow and teaching ineffectual.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING BASIC SKILLS IN DRAWING

Demonstrations were rated by those responding to the questionnaire as superior to all other audio-visual aids when used to teach basic skills in drawing. No other teaching aid

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

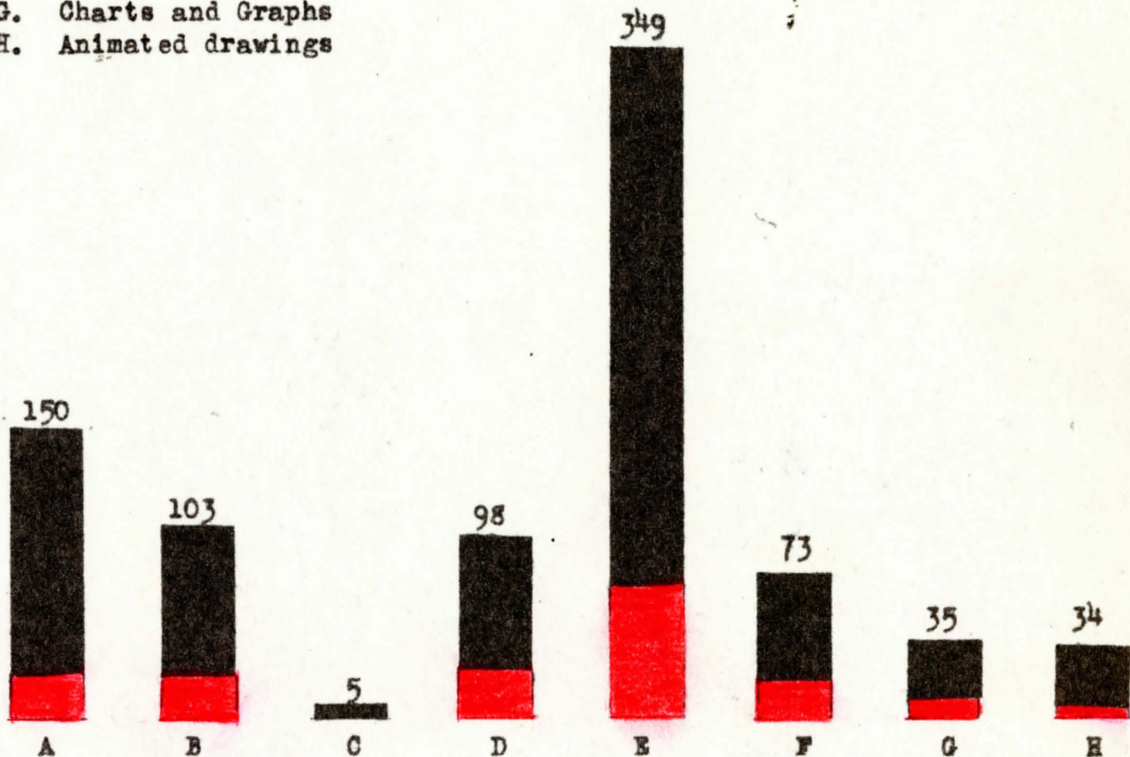


Figure 7. Audio-visual aids recommended for teaching basic skills in drawing.

received even half as many "votes" as did demonstrations with its weighted valuation of 349. Valuations of 150 for motion pictures and 103 and ninety-eight for still pictures and models and mock-ups make these aids appear to be distinctly secondary in importance to demonstrations, but still of definite value to the teacher. Lectures, charts and graphs, and animated drawings occupy the lowest positions of the scale of valuation with respective scores of seventy-three, thirty-five, and thirty-four.

That lecture is invariably used in connection with most of the other audio-visual aids is, of course, recognized, but when spoken of as an audio-visual aid it should be remembered that reference is made to a formal lecture, as distinguished from the spoken words of explanation which must always accompany the use of any of the other audio-visual aids.

It seems safe to say, as a result of the outcome of this study, that "showing how to do it" in a junior high school course in drawing is best accomplished when the teacher makes use of demonstrations as a visual aid. The motion picture was probably given second choice because it, too, is an excellent means of "showing how"--a form of demonstration in itself, with some distinct advantages of its own.

The film demonstration can be definitely applied to the average class demonstration because: A group of students can see what is being done with equal clarity and from identical viewpoint; the motion picture permits complete control of the time needed and can slow down important operations or speed up the operations of little learning value. (3: 223-224)

Still pictures and models and mock-ups which were chosen as third and fourth in order of value to the teacher, would probably be used as examples of perfection after which students

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

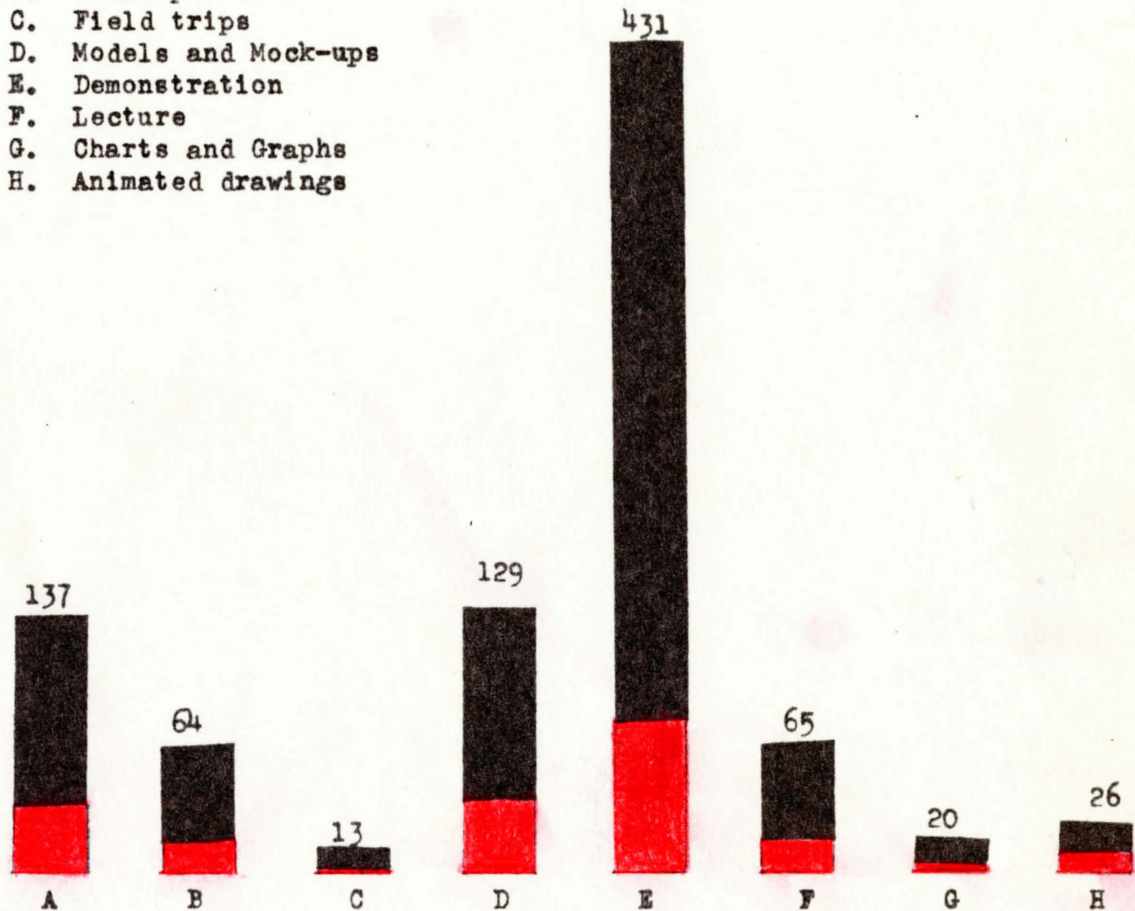


Figure 8. Audio-visual aids recommended for teaching basic skills in woodworking and painting.

may pattern.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING BASIC SKILLS IN WOODWORK AND PAINTING

The teachers, whose opinions form one source of information for this study, are in overwhelming agreement that no other visual aid contributes to the teaching of basic skills in woodwork and wood finishing so much as do demonstrations. This is indicated by the weighted valuation of 431 given to demonstrations as compared to 137 for motion pictures, the visual aid chosen as second best for teaching this phase of the junior high school industrial arts program.

Field trips, charts and graphs, and animated drawings appear to be somewhat unsuitable as aids to the teaching of basic skills in woodwork and painting as is indicated by the low valuations shown in Figure 8.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING BASIC SKILLS IN CRAFTWORK

Figure 9, page 34, indicates that the teachers consulted in the survey have a very marked preference for demonstrations as the most valuable instructional aid in the teaching of basic skills in craftwork. This preference is very evident in all of the selections concerning the basic skills whether it be in craftwork or any of the other subject matter areas--evidencing again the important role that the demonstration plays in showing students how to do the job.

Models and mock-ups with a weighted valuation of 147,

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

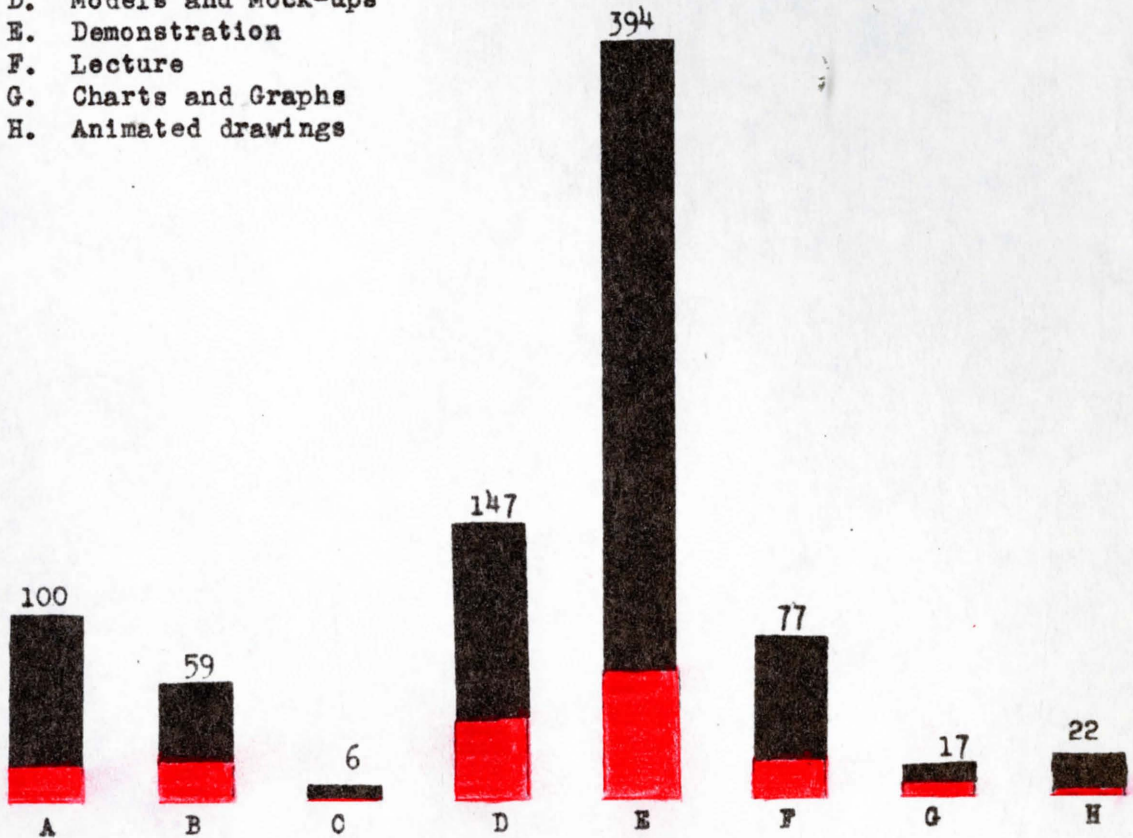


Figure 9. Audio-visual aids recommended for teaching basic skills in craft work.

somewhat less than half of the rating of 394 given to demonstrations, was second choice among visual-aids recommended for teaching basic skills in craftwork. Motion pictures, often used as a form of demonstration ranked third in order of popularity among the teachers consulted. The remaining five audio-visual aids included in the study were grouped near the lower end of the scale of effectiveness and for this reason must be considered of slight value except as they may be used in conjunction with some of the more effective teaching aids.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING BASIC SKILLS IN GENERAL METALS AND GENERAL ELECTRICITY

Figures 10 and 11, pages 36 and 37 show the teaching aids recommended for the teaching of basic skills in general metals and general electricity. Examination of these charts reveals that the teachers who responded to the questionnaire have made recommendations for the subject matter areas of general metals and general electricity that are almost identical to those made for the teaching of craftwork. That is, the aids selected as most valuable in order of their effectiveness are: (1) demonstrations (2) models and mock-ups (3) motion pictures and (4) lecture. The remaining four aids must be considered to be less valuable on the basis of the low valuation given them by the "experts." However, even though some of the aids are found to be near the bottom of the list, there may be times when they will help to make the lesson meaningful.

In teaching skills the demonstration method will often be used. It ranges from how to file a saw to the making of a linoleum cut, with dozens of variations in between. This procedure of teaching through guided performance will be followed at many points in industrial arts and vocational training.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

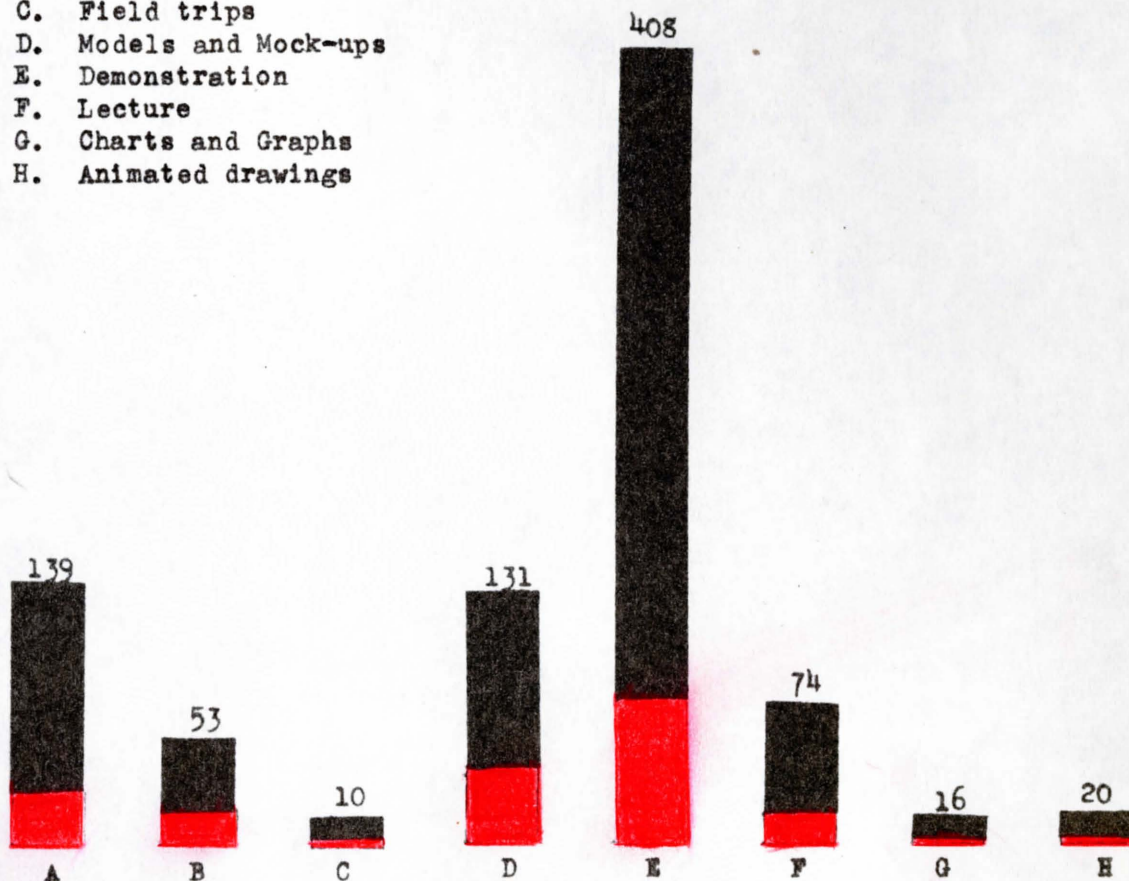


Figure 10. Audio-visual aids recommended for teaching basic skills in general metals.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

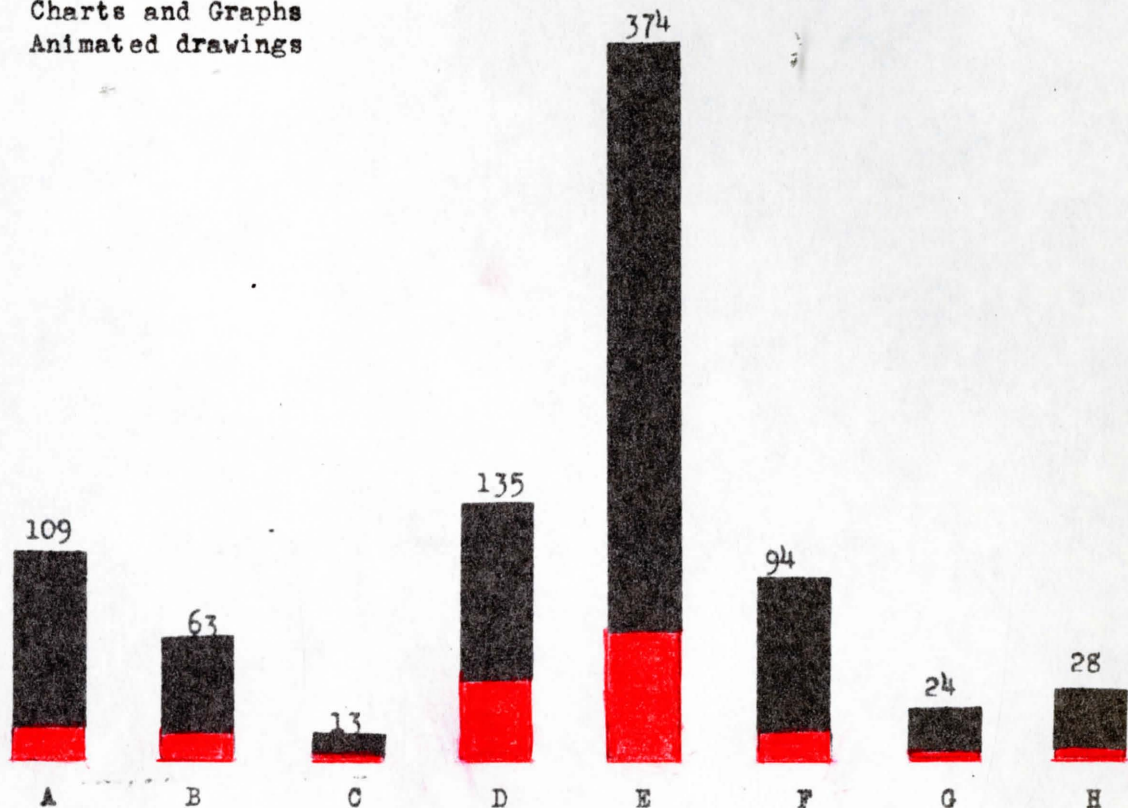


Figure 11. Audio-visual aids recommended for teaching basic skills in general electricity.

One question will, however, occur to the teacher of these subjects: Should he make use of additional audio-visual media? Should he follow a demonstration with a film demonstration? Should he use charts with his demonstration? Should he require the students to demonstrate skills to one another? There is no blanket answer to such questions other than the general principle: that one must experiment to find the best combinations of audio-visual methods. (3:420)

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING RELATED INFORMATION IN INDUSTRIAL ARTS

Related information is that part of the course that does not deal directly with the mechanics of doing the job, but rather that information having some connection with the subject but not essential to the skills involved. For instance, in the woodwork area, forestry, the manufacture of glue and veneers, and the use of woods, etc., is related information.

From the foregoing definition it can be seen that related information covers a very wide field of subjects. The teaching of related information requires that the students be made familiar with a great many things and processes that are entirely foreign to them. It also requires that students be given an opportunity to become acquainted with things that are going on in distant places as well as the activities of their own areas.

A comparison of the charts shown in Figures 12, 13, 14, 15, and 16 (pp. 39 - 43) shows that in each of the five subject matter areas under consideration, motion pictures have been given the highest weighted valuation with field trips as second choice. Lectures in the fields of drawing and woodwork are given third place in the recommendation, but in craftwork and general metals and electricity, still pictures

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

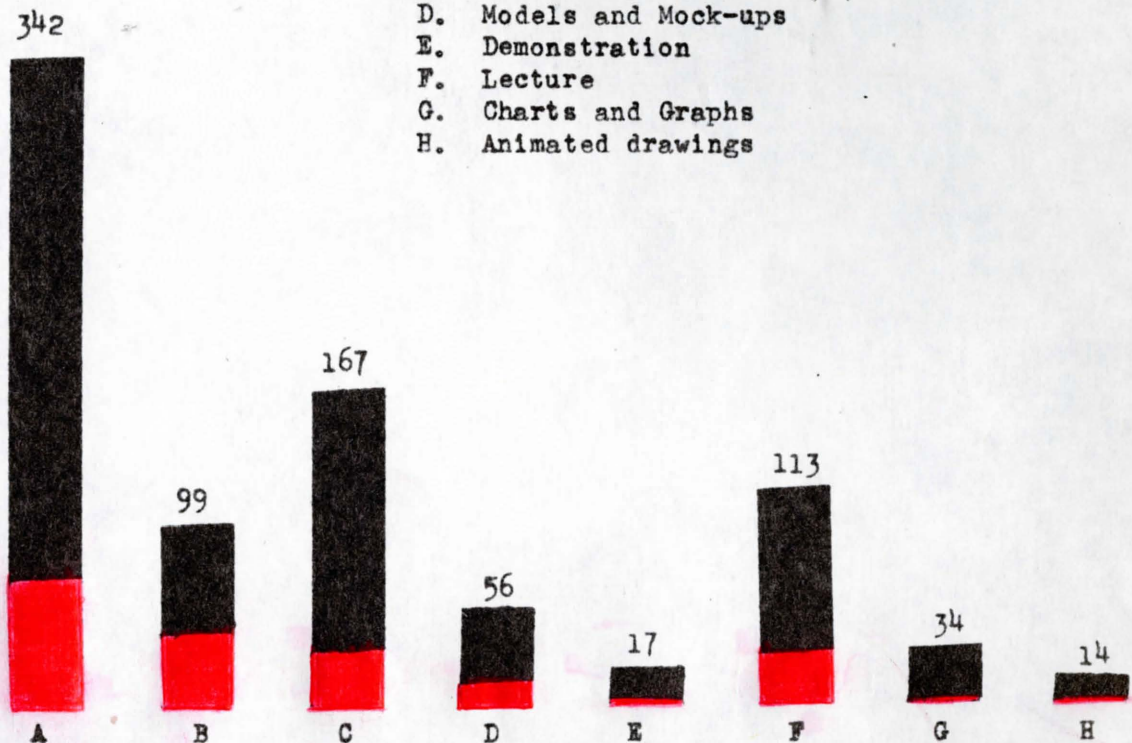


Figure 12. Audio-visual aids recommended for teaching related information in drawing.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings.

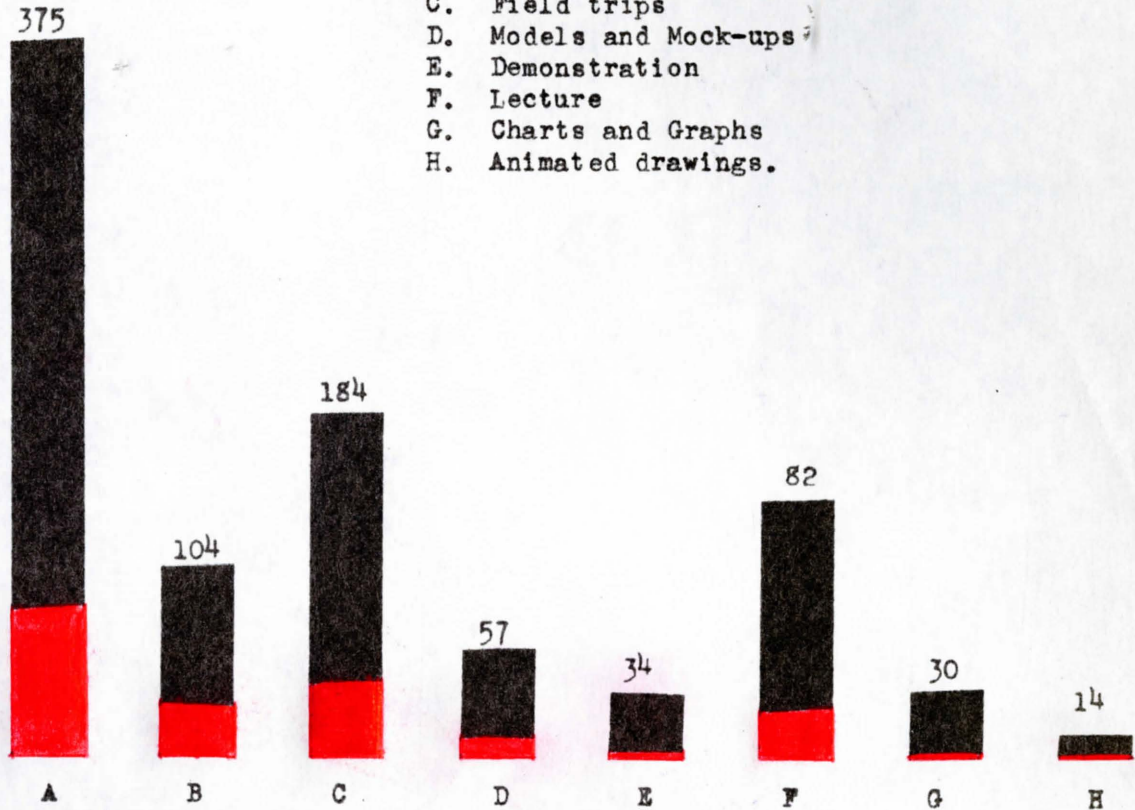


Figure 13. Audio-visual aids recommended for teaching related information in woodworking and painting.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

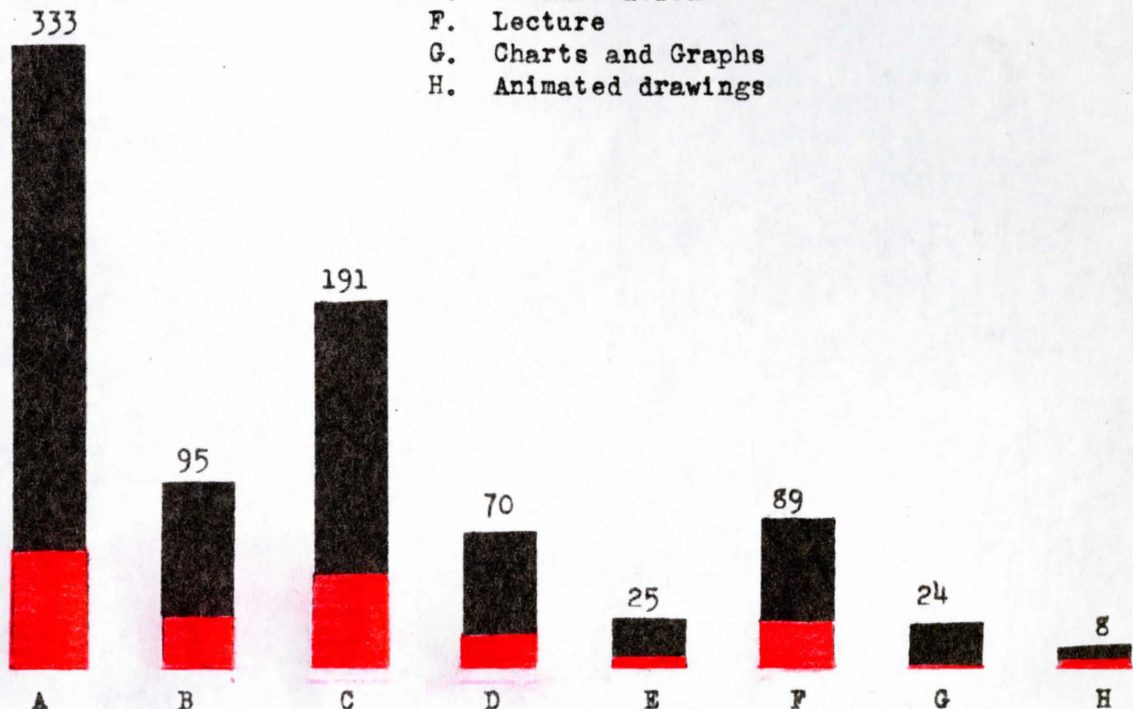


Figure 14. Audio-visual aids recommended for teaching related information in craftwork.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

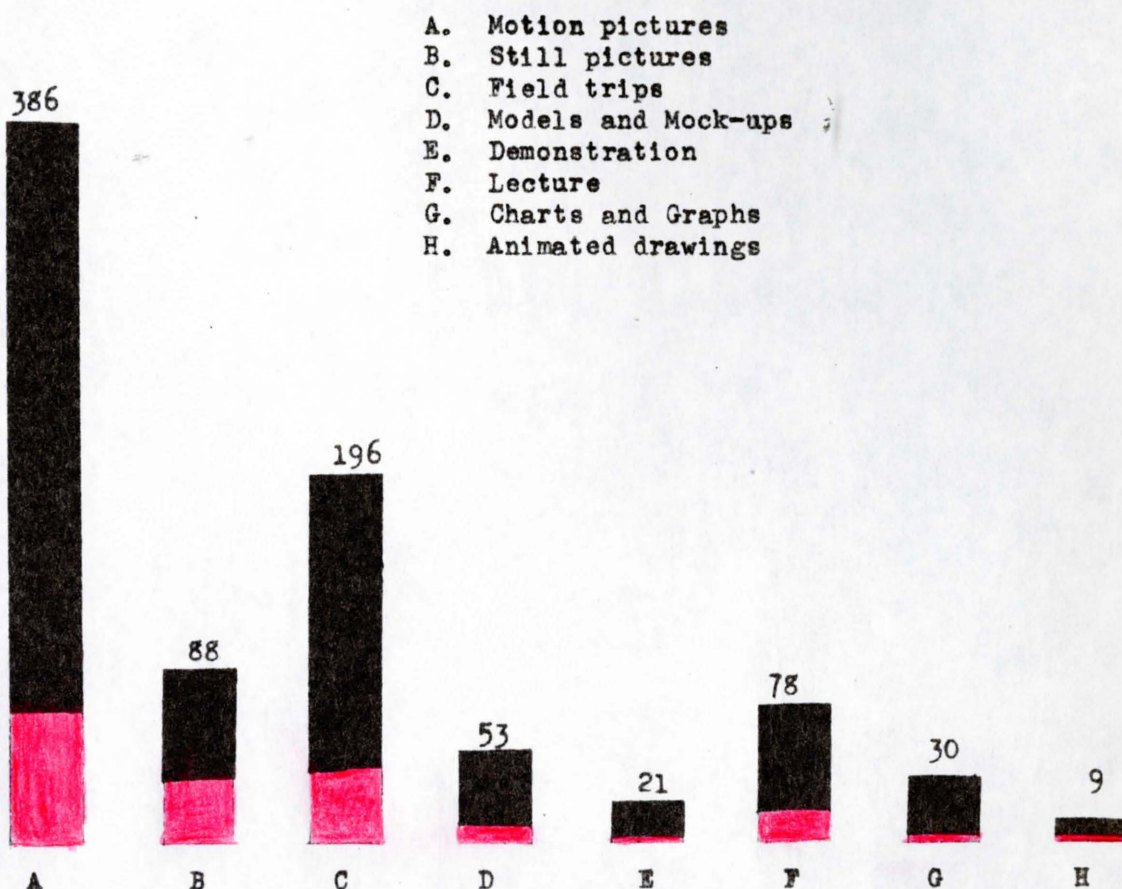


Figure 15. Audio-visual aids recommended for teaching related information in general metals.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

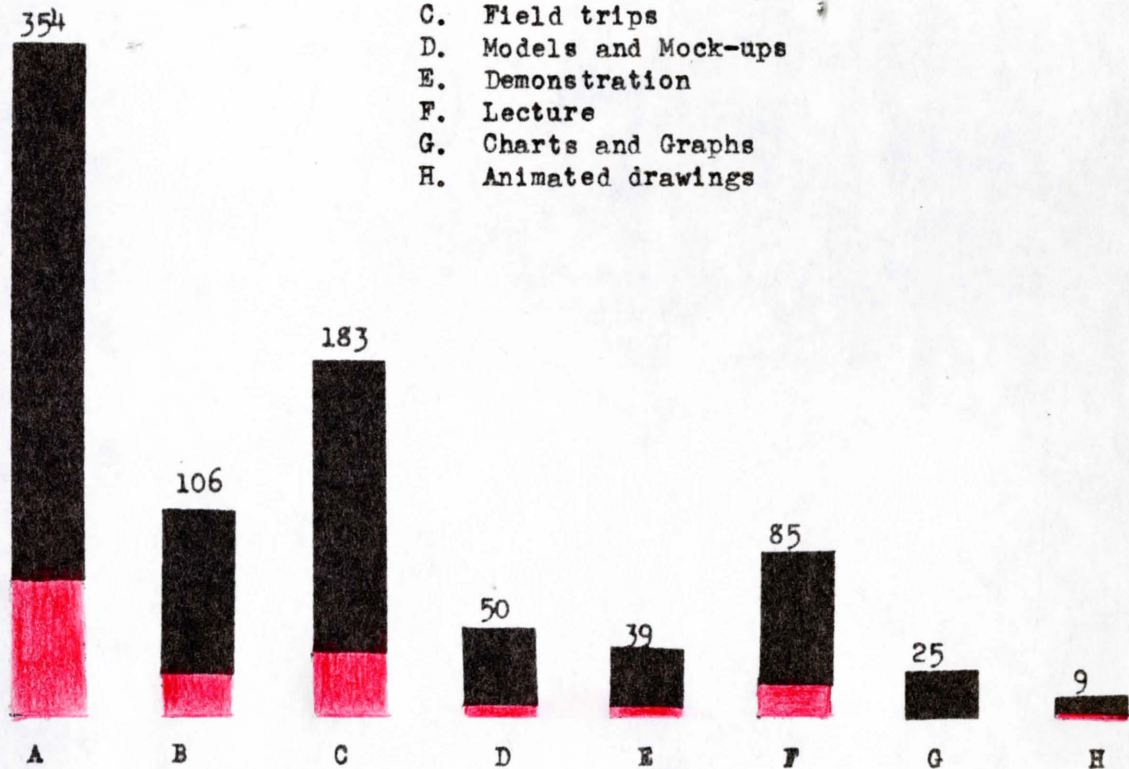


Figure 16. Audio-visual aids recommended for teaching related information in general electricity.

are rated slightly higher than are lectures.

Among the remaining audio-visual aids not one is highly recommended for the teaching of related information, but it must be remembered that under certain circumstances some of these aids receiving lesser recommendations might be ideal. This is especially true in the teaching of related information which, as has been pointed out, includes a very wide variety of subjects--some of which may require special treatment in order to make the information clear and meaningful to the students. For example, the animated drawing (which is one form of the motion picture) might conceivably prove to be the very best teaching aid that can be found to teach the operation of a telephone, even though it is found to be near the bottom of the list of recommendations.

Interpretation of the recommendations made by those consulted in the study must, of course, be made with the realization that they are of a general nature and that in certain specific instances it may be wise to deviate from them.

AUDIO-VISUAL AIDS RECOMMENDED FOR TEACHING TOOL SAFETY

Teachers of industrial arts have a problem which is somewhat peculiar to their field--a problem which is not generally shared in the same degree by the teachers of other subjects. Since the industrial arts program involves the use of tools and machinery which are potentially hazardous to those who use them, the teacher must include in his instructional program some means to prevent accidents and to promote safe practices.

Figures 17 and 18 illustrate the relative effectiveness of different audio-visual aids where used in connection with the teaching of safe practices in the use of hand and machine tools.

Motion pictures were favored as a first choice by the teachers consulted in this study. Demonstrations received the second greatest number of votes with still pictures and lectures being almost tied for third place. The recommendations were very similar for both hand and machine tools. The following differences are shown in the charts illustrating the choices: In the teaching of machine tool safety, charts and graphs were felt to be least effective, while field trips was the last choice for instruction in hand tool safety. In the case of hand tool safety instruction, charts and graphs were sixth in order of popularity while field trips were given the same rating in the teaching of safe practices in the use of machine tools. With the above-mentioned two exceptions, the order of preferences will be found to be the same for both hand and machine tool safety.

It is interesting to note that animated drawings were rated as more useful in the teaching of safety than in any of the other subject matter areas. It seems quite possible that the reason animated drawings were felt to be more useful in teaching safety than in any of the other areas is because of the necessity of showing the students some of the serious hazards to be avoided which might be illustrated by an animated picture more effectively than by any other means short of a real accident.

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and Graphs
- H. Animated drawings

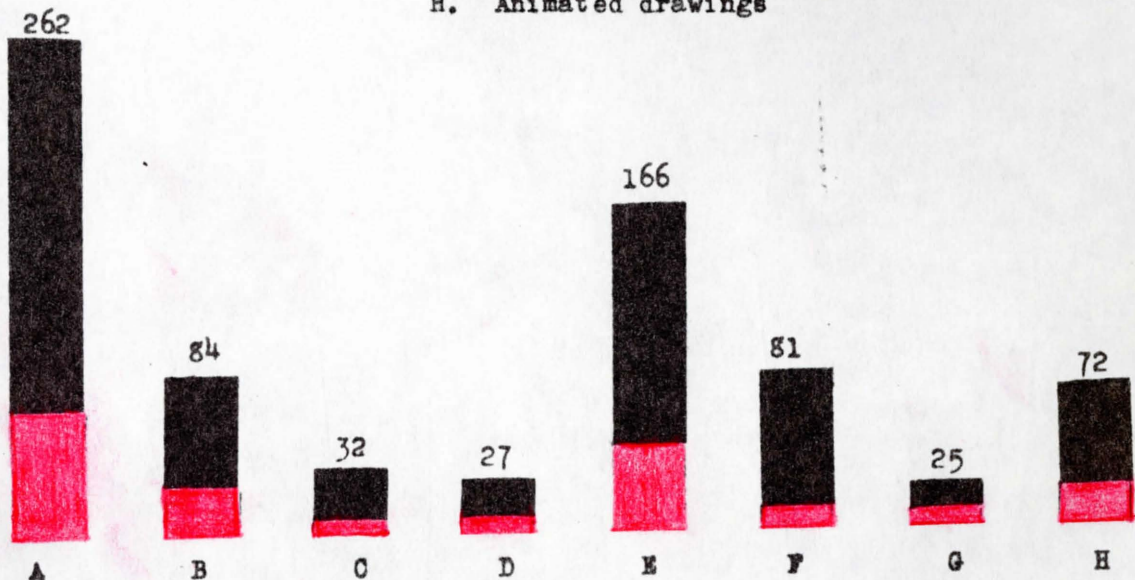


Figure 17. Audio-visual aids recommended for teaching machine tool safety

KEY

The figures at the tops of the columns represent the relative values of weighted choices.

The red portion of the column represents the responses from junior high school teachers; the black represents the responses of the college people.

- A. Motion pictures
- B. Still pictures
- C. Field trips
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and graphs
- H. Animated drawings

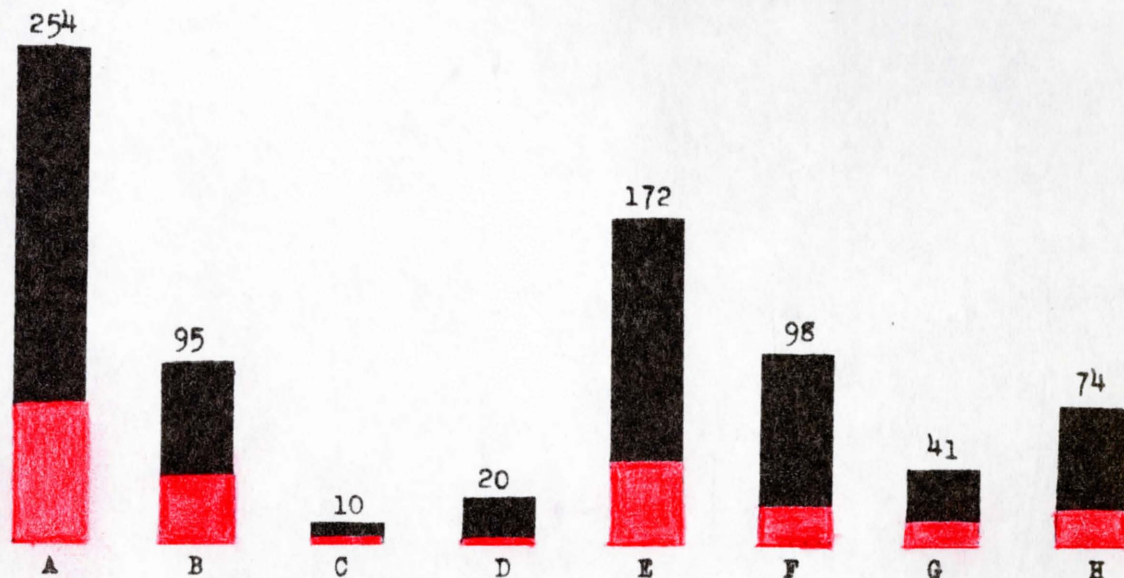


Figure 18. Audio-visual aids recommended for teaching hand tool safety.

A comparison of the figures dealing with each of the four phases of instruction under consideration in this study shows that the recommendations made for one subject matter area are in general agreement with those made for each of the other subject matter areas. For example: The teacher would do well to use the same general types of audio-visual aids for introducing his students to a new subject matter area whether the introduction be in woodwork, drawing, or any of the other areas under consideration. When exceptions to this exist they are pointed out in the foregoing discussion.

The opinions of the junior high school teachers are in close agreement with those of the teachers in the industrial education departments of the college. When the proportion of responses from both sources is kept in mind, a comparison of the red and black parts of each bar of the graphs shows that the differences of opinion between the two groups is not of significant proportions.

In the cases where no part of the bar is red, it must be remembered that one single first choice from a junior high school teacher would have been sufficient to bring the results into line with the relative numbers of responses received from each source.

When recommendations of this study are compared with the lists showing the order of popularity of visual aids reported in the study made by R. W. Rogers and which is referred to in another part of this study, it is found that they are not at all in agreement. The writer wishes to point out that Rogers was seeking to learn which audio-visual aids were being used

in teaching woodwork, in the United States. The present investigation is concerned, not with what is being done, but rather with what, in the opinion of the "experts", is considered to be the best thing to do.

GENERAL SUMMARY AND CONCLUSIONS

Many surveys have been made in past years to determine the effectiveness of audio-visual aids to teaching. Some have dealt with what is being done. Others have sought to learn the effectiveness of teaching aids as related to specific subject matter areas. This study is an attempt to determine which general types of audio-visual aids are most effective in the teaching of industrial arts in each of the subject matter areas included in the industrial arts program recommended by the State Department of Public Instruction for the junior high schools of Utah. The problem was stated as follows:

In each of the subject matter areas included in the industrial arts programs of the junior high schools of Utah, which audio-visual teaching aids can contribute most to making the material in those areas vital and meaningful in the teaching process.

It was decided to approach the problem by obtaining the opinions of experienced industrial arts teachers and teachers in the industrial arts teacher training departments in the universities and colleges of the United States.

Questionnaires were prepared and sent to fifty-one industrial arts teachers in Utah junior high schools, and to 141 teachers in industrial education departments in United States colleges and universities. Of the fifty-one questionnaires that were sent to junior high school teachers, twenty-four were returned and used in this study. Eighty-eight of the

141 questionnaires sent to college people were returned. Of this number eighty were used in this study. Fifty-eight and three tenths per cent of the questionnaires sent out were returned; 54.7 per cent were usable. For the purpose of this investigation the Utah junior high school industrial arts program was chosen. The reason for this choice was the fact that an attempt is being made by the Utah State Department of Public Instruction to unify the industrial arts programs of the junior high schools. For this reason the results of the study are potentially of value to more teachers than would be the case if it were to have been made on some other school level.

The following recommendations are made in summary and on the basis of the results of this thesis study. They are intended to serve as a guide to junior high school industrial arts teachers generally and to the teachers in Utah junior high schools in particular, in the selection of audio-visual teaching aids.

(1) Motion pictures should be used as a first choice among audio-visual aids when introducing students to the subject matter area of woodwork and painting. It is recommended that well-prepared teaching aids be chosen from among the following types to supplement the first choice or to be used when suitable motion pictures cannot be obtained: 1. demonstrations; 2. field trips; 3. models and mock-ups. Still pictures or lectures should be used when none of the above-mentioned aids are available. Charts and graphs and animated drawings should be avoided in introducing students to woodwork and painting.

(2) It is recommended that demonstrations be used in

preference to other audio-visual aids when teaching basic skills in woodwork and painting. Motion pictures or models and mock-ups should be used as a second choice when well-prepared motion pictures are not available or may wisely be used in addition to motion pictures. A third selection should be made from either still pictures or lectures. Field trips, charts and graphs and animated drawings should be considered only when some special application makes their desirability evident.

(3) It is recommended that motion pictures be used to teach related information in woodwork and painting in preference to other teaching aids. Field trips should be used as a second choice to motion pictures and lectures should be used in connection with the first and second choices or when no suitable motion picture can be found or a satisfactory field trip cannot be arranged. Still pictures should be used as a fourth choice and models and mock-ups, demonstration, charts and graphs and animated drawings should be used to teach related information in woodwork and painting only when their values become apparent for special situations.

(4) It is also recommended that motion pictures be used in preference to other audio-visual aids in introducing students to the subject matter area of drawing. A second choice should be made from among demonstrations, models, and mock-ups, field trips and still pictures, and when no suitable audio-visual aids of the afore-mentioned types are available, lectures should be used either alone or in connection with

more effective types. It is recommended that charts and graphs and animated drawings be avoided in introducing students to a course in drawing.

(5) It is recommended that demonstrations be used in preference to other audio-visual aids in teaching basic skills in drawing. Motion pictures should be used as a second choice; and a third choice should be made from still pictures or charts and graphs. It is recommended that lectures be used in connection with other recommended visual aids or when others are not available; that field trips be avoided and that charts and graphs and animated drawings should not be used, except where special circumstances make their use desirable.

(6) It is also recommended in connection with the teaching of related information in the subject matter area of drawing that motion pictures be used in preference to other audio-visual aids. Field trips should be used as a second choice, and a third choice should be made from lectures and still pictures. Models and mock-ups should be used when the above-mentioned aids are not available or when they need to be supplemented, and demonstrations, charts and graphs, and animated drawings should be avoided unless it is evident that their use will be a valuable contribution to the teaching process.

(7) It is further recommended in connection with introducing students to a course in craftwork that motion pictures be used as a first choice among audio-visual aids. Models and mock-ups should be used as a second choice and demonstrations should be used when the other two are not available in

suitable form. Field trips should be used as a fourth preference and a fifth choice may be made from lectures and still pictures. Animated drawings and charts and graphs are to be avoided unless some special consideration is involved.

(8) Demonstrations should be used in preference to other audio-visual aids in teaching basic skills in craftwork. Models and mock-ups should be used in conjunction with demonstrations, or when suitable demonstrations cannot be arranged. Motion pictures should be used as a third choice and lectures should be used in connection with the more effective aids or alone, only when the other teaching aids mentioned above cannot be utilized. It is recommended that still pictures, animated drawings, charts and graphs and field trips be used only if they can make some special contribution to the teaching process.

(9) It is recommended that motion pictures be used to teach related information in craftwork in preference to other audio-visual aids. The following recommendations are also made in connection with the teaching of related information in craftwork; that field trips be used as a second choice among audio-visual aids; that a third choice be made from still pictures and lectures and that if a fifth choice is necessary that models and mock-ups be used; that demonstrations, charts and graphs, and animated drawing be avoided except in instances when their use can make some special contribution.

(10) It is further recommended, in connection with the presentation of an introduction to a course in general metals, that motion pictures be used in preference to other audio-visual aids. Field trips should be used as a second choice

and demonstrations as a third choice. In case the above three are unavailable, a fourth choice should be made from still pictures and lectures. Charts and graphs are not recommended for use in introducing a class to a course in general metals.

(11) It is recommended that demonstrations be used in preference to all other audio-visual aids in the teaching of basic skills in general metals. In the field of general metals a second choice of teaching aids should be made from motion pictures, and models and mock-ups. Lectures should be used as a third choice and still pictures should be used only as a supplement to the above-mentioned aids, or when they are not available. Charts and graphs and animated drawings are not recommended.

(12) It is further recommended, in connection with the teaching of related information in general metals, that motion pictures be used in preference to other audio-visual aids. Field trips should be selected as second choice and still pictures and lectures should be third and fourth choices, respectively. Should the above-mentioned aids be unavailable, models and mock-ups should be used as a fifth selection. Charts and graphs, demonstrations, and animated drawings should be used for special applications only.

(13) Motion pictures should be used in preference to other audio-visual aids in introducing students to the subject matter area of general electricity. In connection with introducing students to a course in general electricity, it is also recommended that field trips be used as a second choice among

audio-visual aids and that a third choice be made from models and mock-ups and demonstrations. Fourth and fifth choices, should they be necessary, are lectures and still pictures in that order. Charts and graphs and animated drawings should be avoided unless they can make some special contribution.

(14) It is recommended that demonstrations be used in preference to all other audio-visual aids in teaching basic skills in general electricity; and that, in connection with the teaching of basic skills in this subject matter area, models and mock-ups be given second preference and that motion pictures be third choice among audio-visual aids. Fourth and fifth choices should be lecture and still pictures, respectively, and animated drawings, charts and graphs, and field trips should be used only when special circumstances make it seem wise to use them.

(15) It is further recommended, in connection with the teaching of related information in general electricity, that motion pictures be used as a first choice among audio-visual aids; that field trips be used as a second choice and that the third choice be still pictures. Lectures should be used in connection with the preferred audio-visual aids, or when other recommended aids are not available. Models and mock-ups, demonstrations, charts and graphs, and animated drawings should be used only under special circumstances for teaching related information in general electricity.

(16) In connection with the teaching of safe practices in the use of both hand and machine tools, motion pictures

should be used in preference to other audio-visual aids. Demonstrations should be used as a second selection and a third choice should be made from among still pictures, lectures, and animated drawings. Field trips, models and mock-ups, and charts and graphs are to be avoided except when special situations make them particularly desirable.

(17) It is further recommended: that the teacher use the very best audio-visual aids that he can secure from those included in the recommended types; that the teacher should feel free to deviate from these recommendations when his personal experience shows that audio-visual aids other than those recommended in this study are better for his particular purpose and for his individual circumstances.

A P P E N D I X A

UTAH STATE AGRICULTURAL COLLEGE

FRANKLIN STEWART HARRIS, PRESIDENT

LOGAN, UTAH

INDUSTRIAL DIVISION

Dear Sir:

In connection with the industrial education department at this college and in the interest of training better teachers, I am attempting to prepare a guide for evaluating audio-visual aids for use in the teaching of industrial arts on the junior high school level.

Because of your experience in industrial arts education, I feel that your ideas and opinions will be an invaluable aid to me in the preparation of this guide.

Will you kindly fill in the accompanying questionnaire and return it to me in the enclosed envelope?

Every effort has been made to make the questionnaire short and easy to complete. Your cooperation will be highly valued and very much appreciated.

If the results of this study prove to be valuable, a copy will be made available to you if you would care to have one.

In order to make this information most valuable to me, it is necessary that I receive your reply as soon as it is possible for you to give it your attention -- by March 30th -- please.

Sincerely,

Dan H. Swenson, Instructor
Division of Technology

DHS:nt

INSTRUCTIONS

Please indicate which teaching aids you feel, as a result of your experience, are best suited to help the teacher to present an area of study to his students. By filling in the blanks under each of the subjects listed, please indicate your choice from the list following these instructions. Enter the letter preceding the teaching aid you consider to be most effective in the top blank of the column and continue in the descending order of their values.

- A. Motion Pictures
- B. Still Pictures
- C. Field Trip
- D. Models and Mock-ups
- E. Demonstration
- F. Lecture
- G. Charts and graphs
- H. Animated Drawings
- I. Others (Write in Suggestions)

Evaluate on the assumption that well prepared teaching aids of each type are available to the teacher.

The following is a sample showing the procedure to be followed in completing the questionnaire.

What audio visual aids would be most effective in teaching an appreciation of good workmanship in the following subjects:

	Drawing	Woodwork and Painting	Craftwork (Leather - Plastics etc.)	General - Metals	General - Electricity
1st		D			
2nd		C			
3rd		B			
4th		A			
5th		F			
6th		E			
7th		G			
8th		H			

It is not intended that you fill any blanks in this sample.

Please indicate your choices by filling in each of the columns on the following pages in the same manner as the column completed above. Place the symbol of the most effective aid in the top space of the column and continue in descending order of value.

The list of audio-visual aids found at the top of this page is to be used in filling the blanks on the following pages

I. What audio-visual aids will best serve to introduce the students to a new field or area and give them an over view of its possibilities?

AREAS

	Drawing	Woodwork and Painting	Craftwork (Leather-plastics, etc.)	General Metals	General Electricity
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					
8th					
9th					

II. What audio-visual aids will be most effective in teaching basic skills and tool processes in the following subjects:

AREAS

	Drawing	Woodwork and Painting	Craftwork (Leather-plastics, etc.)	General Metals	General Electricity
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					
8th					
9th					

Related material is that information having some connection with the subject but not essential to the skills involved. For instance, in the woodwork area, forestry, the manufacture of glue and veneers, and the use of woods, etc., is related material.

III. What audio-visual aids will be most useful in making related material meaningful?

	Drawing	Woodwork and Painting	Craftwork (Leather-Plastics, etc.)	Teneral Metals	General Electricity
1st					
2nd					
3rd					
4th					
5th					
6th					
7th					
8th					
9th					

IV. What audio-visual aids are best for teaching safety in the use of tools?

	Hand Tools	Machine Tools
1st		
2nd		
3rd		
4th		
5th		
6th		
7th		
8th		
9th		

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A P P E N D I X B

FACTORS IN PLANNING FOR THE USE OF AUDIO-VISUAL AIDS
IN THE TEACHING OF INDUSTRIAL ARTS

In order to make the most effective use of the audio-visual aids which are available to the teacher, it is necessary for him to have certain information and skills. The necessary information and skills in the order of their use are (30: 1-2)

1. Where to obtain appropriate teaching materials.
2. How to make the best use of the material available.
3. How to operate the equipment involved.
4. How to produce visual teaching materials when nothing appropriate can be found.

The important sources of audio-visual teaching materials must be known to the teacher if he is to take advantage of the vast amount of study and research that has been done to help improve teaching through the audio-visual method. There are many directories of film and slide sources which will serve as a guide to the teacher in selecting suitable material for projection. Some of these film directories are listed in the part of this paper dealing directly with the projected aids. Most of the large manufacturers of tools, machinery, and materials have educational departments which make available to the industrial arts teacher training aids of many kinds including posters, charts, diagrams, exhibits, models and samples. Many of these materials are distributed free of charge. A penny post card written to some of these companies will place the teacher on their mailing lists to receive new materials as they are developed.

If the teacher has trouble finding teaching aids which are suitable for his particular problem, the best solution often lies in producing his own. To undertake making his own teaching aids might seem to some teachers to be too much work.

However, there are many items, such as models or mock-ups, which could be built by the students, under the supervision of the teacher, the building of which would have considerable teaching value. For example, if the students were to help prepare a cut-away model of an engine to be used as a demonstration piece in the classroom, they would undoubtedly learn more about the working of the engine than would have been the case without that experience. Frequently the finished projects constructed by the students can be used in an exhibit--an effective teaching aid which consumes little of the teacher's time. To be sure, some homemade teaching aids require considerable time and effort on the part of the teacher, but he is usually well repaid in time saved and in satisfaction gained through more effective teaching.

It is unfair to the students to show a film, to go on a field trip, or to employ any one of the visual aids merely to take up time. Each use of a training aid should have a definite training objective, which is usually to clarify and explain a specific job problem. (30: 3) If the instructor has difficulty with the equipment, or has to hunt for the films or other materials at the time he is ready to use them, the effectiveness of his lesson will be greatly impaired. The teacher who plans to make use of visual education methods ought to be familiar with all of the types of projection equipment commonly used in the school. Familiarizing himself with the operation of the several types of projectors will usually prove to be no obstacle to the industrial arts teacher since mechanical things are his "stock in trade" and a motion

picture projector or slide projector is relatively simple to operate. If it is important for the teacher to know how to use the projection equipment, it is equally important for him to be able to make blackboard illustrations well, to know how to make use of the field trip to enrich his lesson, or how to bring his subject matter to life through the use of models and mock-ups.

In an analysis of the various teaching aids and their use as related to the teaching of industrial arts, the projected aids, which are divided into two types, will be considered first. Among the teaching devices that fall into the classification of "projected aids" are both motion pictures and still pictures. Motion pictures include both silent and sound films. Still picture types that may be used are strip films and slides (both sound and silent) and pictures thrown on the screen by the opaque projector.

Although there is a wealth of training films of all kinds available at almost no cost and even though projection equipment is highly developed and quite generally available in today's schools, many teachers fail to make use of projected aids because lack of proper facilities make their use impractical.

Even though the teacher recognizes the value of visual aids, he often does not feel justified in trying to employ them when classroom conditions make their use inefficient and ineffectual. Many common conditions prove to be obstacles to the use of audio-visual aids, among which are the following : rooms cannot be easily or effectively darkened, projection

equipment is heavy and cumbersome and hard to move, or students must be moved from one room to another for the showing of a film. Darkening of the room sometimes interferes with ventilation and students become sleepy and are able to get little benefit from the picture. At times the teacher may feel the need for showing a single slide or picture (with the opaque projector) to clarify a point in the lesson, but cannot do so because the time involved in setting up the equipment makes such limited use unthinkable.

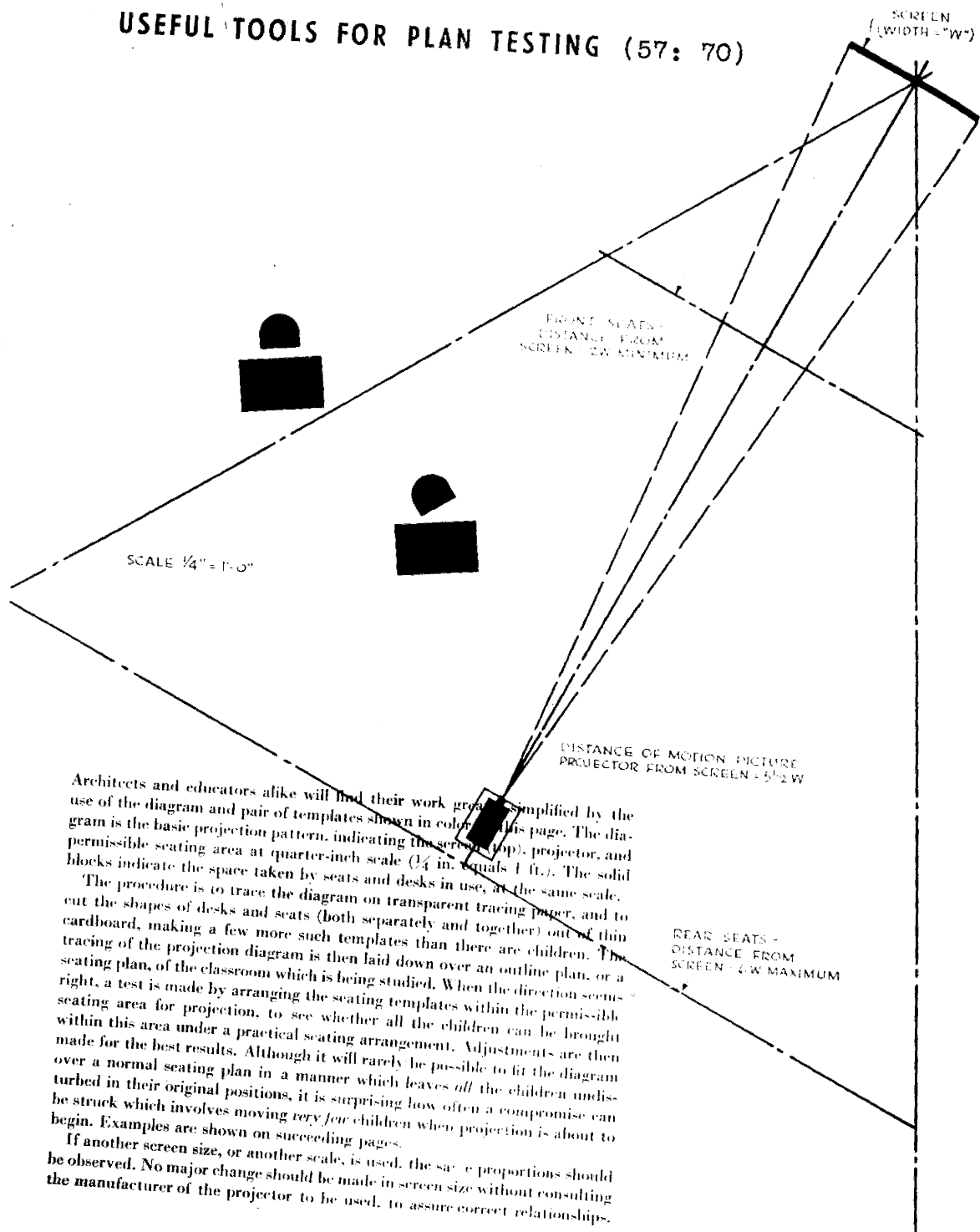
All of these obstacles to liberal use of the projected teaching aids can be overcome or greatly lessened through intelligent classroom planning. The writer realizes that classrooms are already built and that extensive remodeling is out of the question in most cases, but often a few minor changes in the arrangement of the room, together with the addition of facilities for darkening the room, will make a surprising difference to the utility of the room as far as the use of the projection equipment is concerned.

Almost any classroom can be adapted to the easy and frequent use of audio-visual aids, and when these aids can be put to work in the routine, their use will be enormously widened. "The trend is toward brevity in such items as films, and toward 'spot' use. Therefore, many worries associated in the minds of educators with the idea of long 'shows' can be dropped." (57: 68)

Elements to be considered in projection planning include:

- "1. The projection pattern, combined with the seating pattern.
2. Blackout devices. 3. Wiring for projection and for

USEFUL TOOLS FOR PLAN TESTING (57: 70)



Architects and educators alike will find their work greatly simplified by the use of the diagram and pair of templates shown in color on this page. The diagram is the basic projection pattern, indicating the screen, projector, and permissible seating area at quarter-inch scale (1/4 in. equals 1 ft.). The solid blocks indicate the space taken by seats and desks in use, at the same scale.

The procedure is to trace the diagram on transparent tracing paper, and to cut the shapes of desks and seats (both separately and together) out of thin cardboard, making a few more such templates than there are children. The tracing of the projection diagram is then laid down over an outline plan, or a seating plan, of the classroom which is being studied. When the direction seems right, a test is made by arranging the seating templates within the permissible seating area for projection, to see whether all the children can be brought within this area under a practical seating arrangement. Adjustments are then made for the best results. Although it will rarely be possible to fit the diagram over a normal seating plan in a manner which leaves all the children undisturbed in their original positions, it is surprising how often a compromise can be struck which involves moving very few children when projection is about to begin. Examples are shown on succeeding pages.

If another screen size, or another scale, is used, the same proportions should be observed. No major change should be made in screen size without consulting the manufacturer of the projector to be used, to assure correct relationships.

speakers. 4. Attention to acoustics." (57: 69)

Optical considerations determine the projection pattern combined with the seating pattern. The goal is to obtain adequate brightness: to black out stray light that might veil the image: to place the seats not too far to one side of the projection axis as to distort perspective.

The Society of Motion Picture Engineers has worked out standards for non-auditorium projection, based on the width (W) of the image on the screen. Working forward from the screen on the axis, the nearest seats may be placed at a distance equal to 2W; the motion picture projector will usually stand at $5\frac{1}{2}W$; the back seats should not be farther to the rear than 6W. For classroom purposes the width of the screen may usually be taken as 5 ft., but may be varied for special conditions. (57: 69)

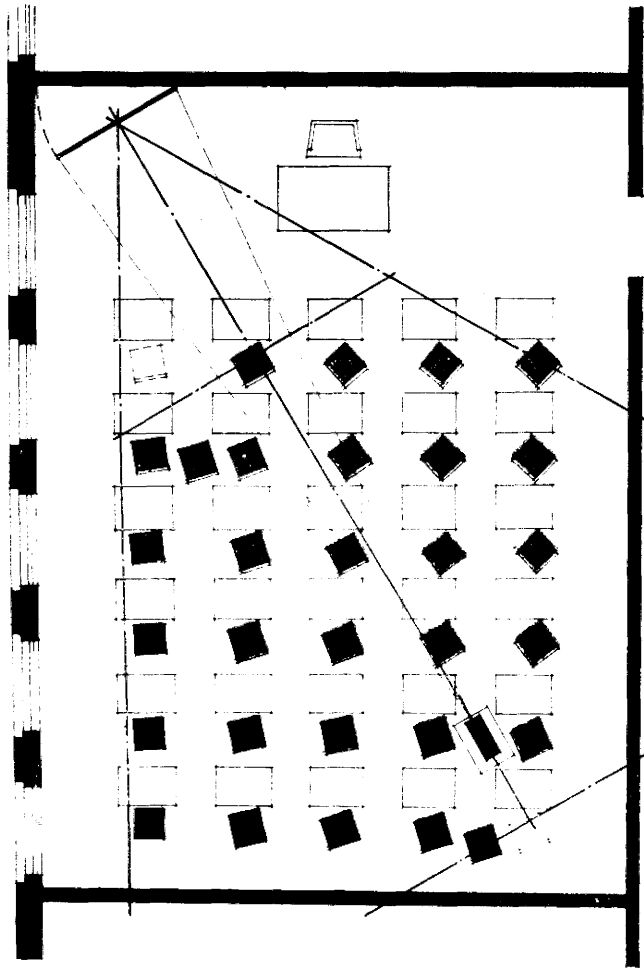
Sound absorption will be provided by drapes and the childrens' clothes; resonance, by the usual plaster or wooden wall surfaces. Desirable acoustic ceilings are being introduced in classrooms for general use.

A built-in speaker is a great convenience in any classroom, to be used interchangeably, if desired with the intercommunication system, the radio-phonograph, or sound pictures. However, there should also be an outlet for portable speakers at the front of the room, connected with the sound outlet for the projector at the rear, to do away with messy 'haywire'. (57: 79)

Plates 2, 3, 4, and 5 are reproduced from the pages of Architectural Record (57: 74-77) and will prove valuable as a guide to teachers in working out suitable seating arrangements in their classrooms. Four examples are shown which cover the majority of classroom types commonly found in this country's schools. Among the several alternatives suggested in these diagrams the teacher should be able to find one which will closely fit his own situation.

When the problem of making the classroom suitable for the use of projected aids has been solved, the next consideration must be the selection of equipment for showing the films,

EXAMPLE 1. THE "CONVENTIONAL" CLASSROOM (57: 74)

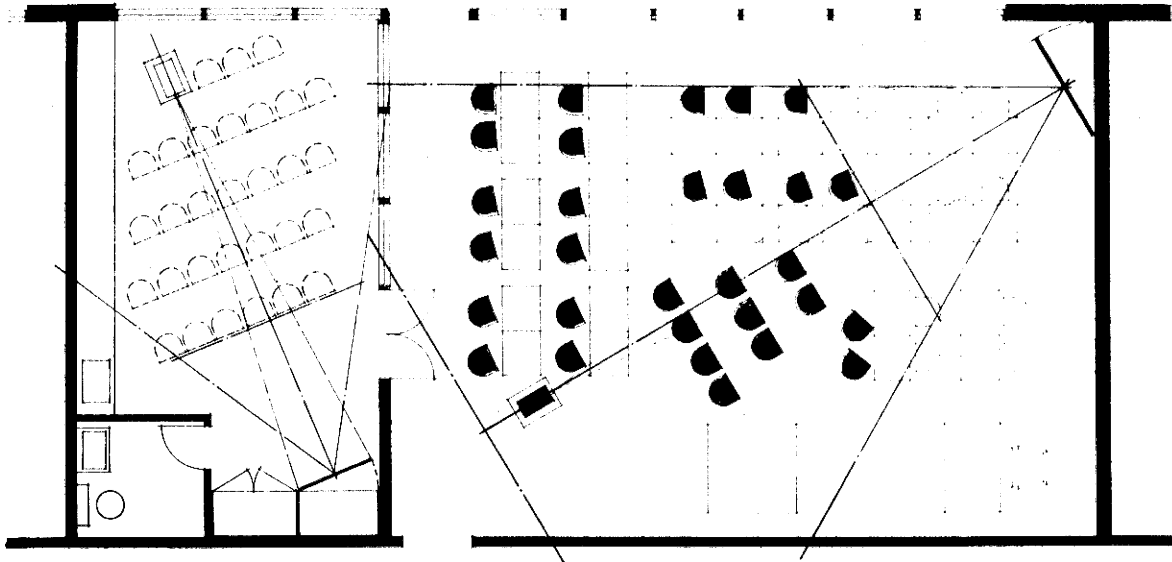


This is the kind of room which is found in schools all through the United States. It is 22 ft. wide and 30 ft. deep. Windows stop at a point about 4 ft. in front of the chalk-board wall.

There might be three possible positions for the projector. Projection might be straight down the center of the room, as seen in the photograph above; or it might be pointed diagonally toward either the inner or the outer front corner. We have chosen the last-named direction because there is a minimum distance to move the stand and projector. Sight lines are unusually favorable — no seat is in the direct line of view of the seat behind it. *Only two children have to be moved before projection begins.* If the room were still shorter, say a minimum of 28 ft., it would still be possible to work this way, moving only two or three seats.

For convenience and easy maintenance, the screen is permanently mounted on a high hinged panel, which is swung out into position when projection is ready to begin. Screen surface must reflect well in wide range.

The squares in the diagram represent seats in position for projection. The seat in the front left corner has been moved back to a position behind the permissible front seating line, and the rear corner seat has been moved away from behind the projector.



EXAMPLE 2. CLASSROOM WITH WORK ALCOVE (57:75)

The prototype for this classroom is the typical room of our Rugen School at Glenview, Illinois. In this kind of plan, the general seating is likely to take any one of a number of patterns, especially in view of the bilateral lighting. We choose a likely seating pattern for purposes of illustration, and demonstrate *two* possible solutions in the use of projection.

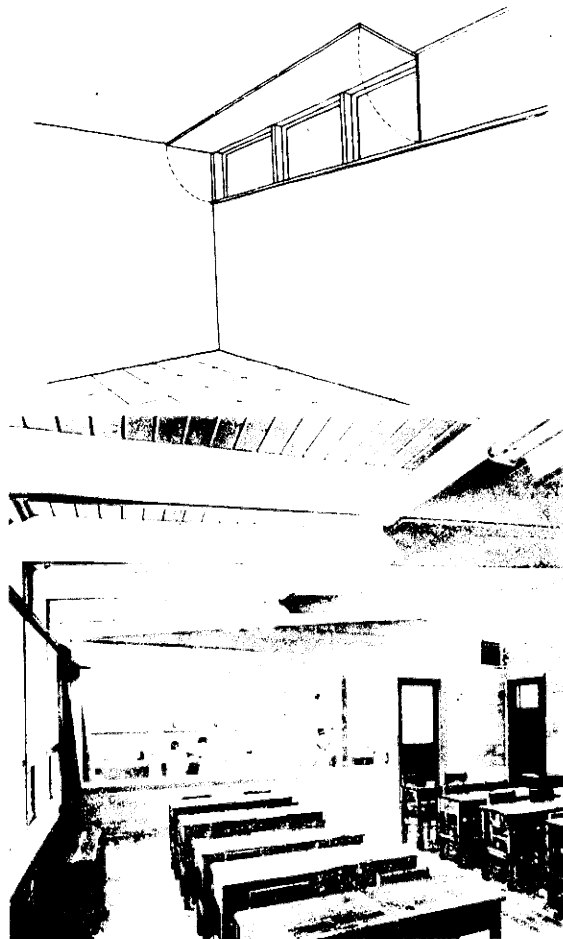
a. Projection in the main room. Basically, this arrangement is very similar to that in the conventional classroom.

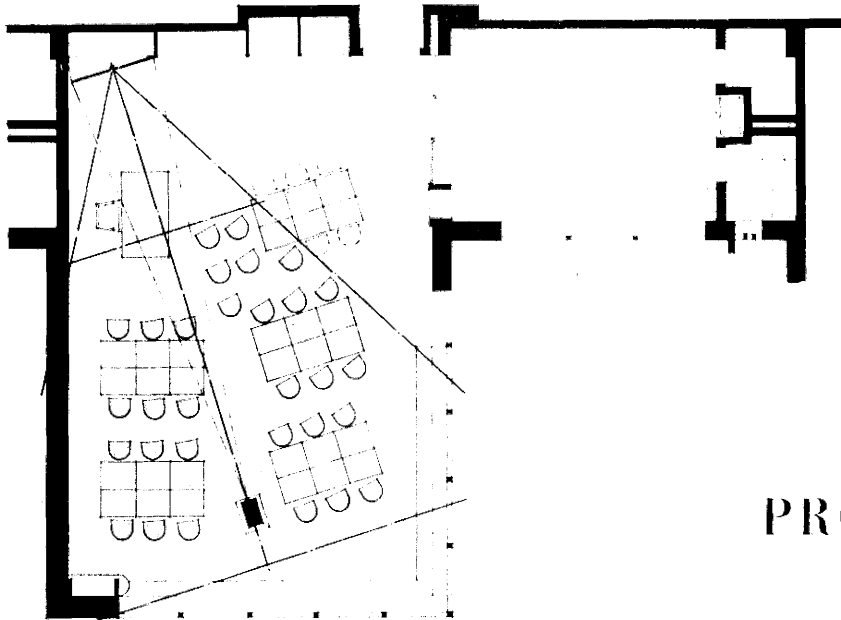
In this example, 11 seats are moved, before projection begins. Again the projector is on a stout movable stand, can be brought into operating position from the corridor with ease.

b. Projection in alcove workroom.

The projectors of less expensive types, such as silent motion picture or slide projectors, can be very conveniently stored adjacent to use.

shapes on the diagram represent seats moved into position for projection in the main room (dotted lines show alcove seating as an alternative). Hinged blinds will be needed to blackout the high transom or clerestory windows, as seen in the drawing. Elsewhere drapes are usually the easiest kind of blackout device for children and teachers to manage quickly





EXAMPLE 3.

THE PROJECTING L

(56: 76)

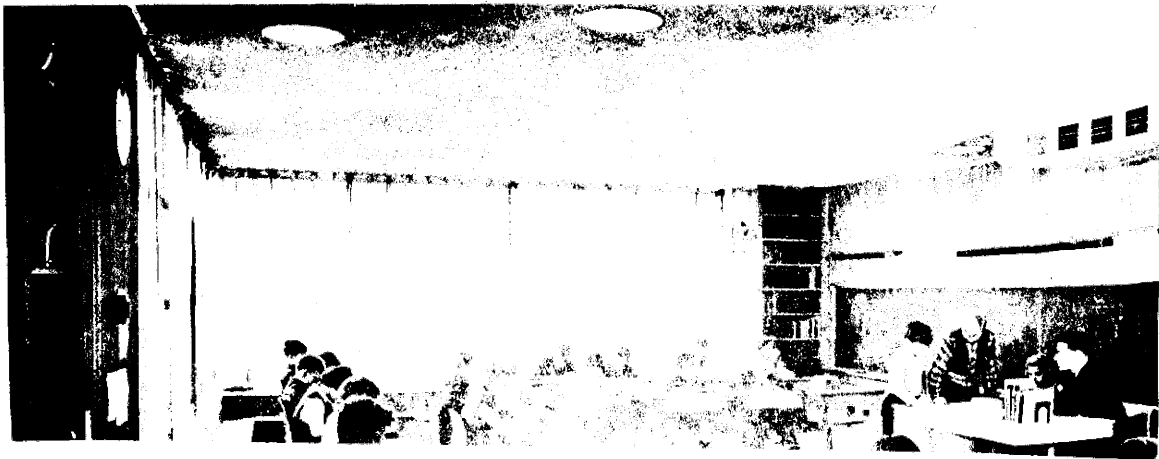
The prototype for this arrangement is the Crow Island School at Winnetka, Illinois, seen in the photograph below. Again, using a hinged screen panel makes it possible to throw the image obliquely. It has seemed better to use the inside corner for the screen, at the greatest possible distance from the windows, even though it might be argued that the corner seen in the photograph would be subject to less veiling light. If we were to use the outer corner, it would also be true that many more children would have to be moved.

This room will need extensive curtaining with black-out drapes, running similarly to the curtain now in use. The alcove has been given a set of sliding doors to cut off the light that might stray in from it.

Only five seats would have to be moved, from the arrangement indicated herein, to put all children within the acceptable projection seating area.

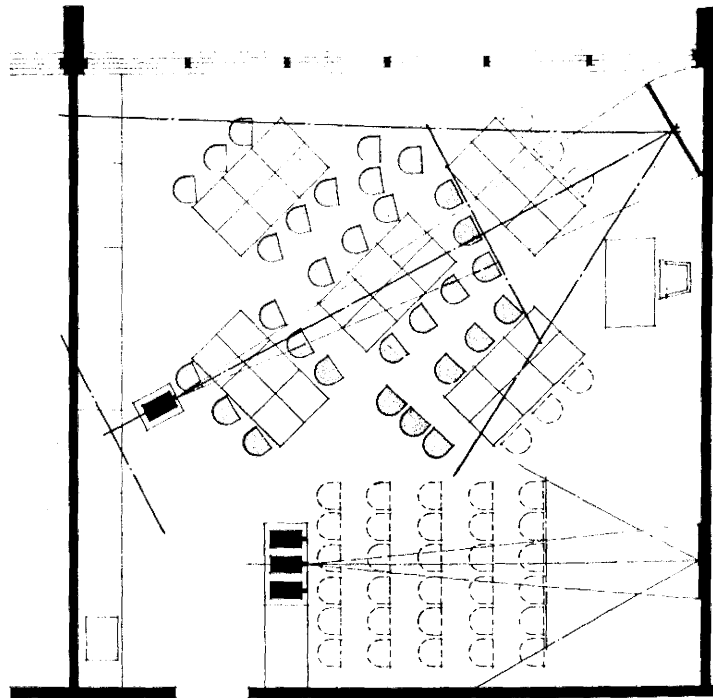
It is interesting that most classroom plans were easier to handle with a movable projector than with any attempt at a fixed or hinged stand.

HEDRICH-BLESSING



EXAMPLE 4.**THE SQUARE
CLASSROOM**

(57: 77)

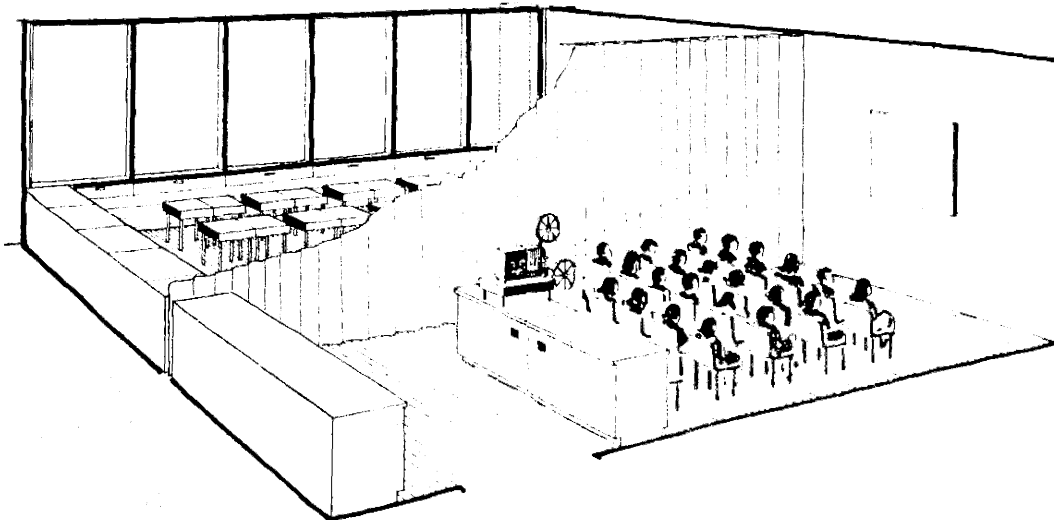


This is a type rapidly spreading eastward from California, where it originated. Code adjustments will soon be made permitting its use in eastern states. It offers a very flexible working area but requires auxiliary sources of light. Again, two solutions:

a. Projection in the main seating area. For this use, the entire room is blacked out, with the same drapes that were suggested for conventional rooms. Six seats are moved by a child while the drapes are being pulled.

b. Projection in the "project" area. (Dotted lines.) This solution has much to commend it despite the fact that all children must move. One suggestion is that they sit on the floor, depending on the warmth from radiant heating. The work area, or projection area, is blacked out with a drape of its own, which may also be helpful in deadening noise on other occasions.

This is the only scheme in which a fixed stand is recommended, as seen in the perspective below. Underneath is space for storage of films, slides, records.



slides, and pictures. In order to be in a position to take advantage of all of the different types of projected teaching aids available, it is necessary that the school have projectors of several types. Ideally, each classroom in which pictures are to be projected should be equipped with a permanently mounted screen and the various types of projectors, both still and movie.

There are several factors which enter into the selection of a projector: such as, the size of the room in which it is to be used, the number of students likely to be in the class, the types of materials to be projected, the amount of money available to purchase equipment, and whether or not the machine is to be used in more than one classroom.

A projector should be carefully and intelligently selected, not only because its direct cost and its indirect cost in materials used, repairs, and replacements, represent a considerable investment, but also because the educational results to be obtained from its use are highly important. Further, an inefficient, or for that matter, inefficiently handled, projector will handicap the healthy development of this phase of visual instruction. (40: 132)

Under certain conditions the film strip or slide projector might be most desirable, and under others the opaque projector might be most useful. The choice of types depends on the materials to be used. However, in the teaching of industrial arts, good use can be made of all of the types of still projectors as well as the motion picture projector.

The following factors should be considered in the selection of a still projector:

The room or rooms in which the machine is to be used must be considered. If the projector will be some distance from the screen an objective lens of a longer focal length will be required than if it

is close to the screen. To determine the correct focal length of the lens one should submit to the companies whose projectors are being considered the size of the picture wanted on the screen and a report of the distance between the proposed placements of screen and projector. If the projector is to be used in a large auditorium in addition to the classroom, it may be necessary to buy a lens of unusually long focal length for this purpose. The 500-watt lamp is used in all standard lantern-slide projectors and any one of the three or four leading makes should give satisfactory service. For the smaller projectors the 100-, 200-, or 300-watt lamp may be used. A heat filter is desirable with bulbs of more than 200-watts. These filters are standard equipment in nearly all the leading makes of small projectors. Naturally, the smaller the lamp the darker the room must be for suitable projection. The other essential parts of the projector are the reflector, the condensers, and the objective lens. The better the quality of these parts the more expensive will be the machine.

The selection of a projector will depend, to some extent, at least, upon the money available for it. In general, especially for a beginner, it is probably better to buy a new machine than a used one. And, obviously, although price is not always necessarily a good index to quality, it is reasonable to assume that the high priced machines are made of better materials and so will give better service than the lower priced devices. (40: 132-33)

The following six points to be considered before buying a projector are suggested by the State Visual Instruction Exchange of Ohio. (40: 131)

1. Write to the leading manufacturers for information and arrange demonstrations.
2. All demonstrations should, if possible, be held on the same day.
3. Use the same screen for all demonstrations.
4. Use the same trial film, either silent or sound, for all makes of machines.
5. Require all agents to make their first demonstration in the presence of one another. This will insure against sales tricks.
6. Use the same room and the same number of people in it for sound projector demonstrations.

In a consideration of the details of a motion picture projector the following points should be noted:

1. Safety. -- The projector should be so constructed that it is mechanically safe to operate. There should be absolutely no fire hazard in either handling or operating.

2. Illumination. -- In general the projector should accommodate at least a 500-watt bulb, and larger if the room is not completely darkened. A machine that will take a 750-, 1000-, or even a 1,250-watt bulb may be necessary if the situation requires it but this is, of course, more expensive, because of the bulb used and also the additional power required.

3. Steadiness of Pictures. -- Flickering or unsteady pictures are tiring on the eyes and therefore decrease the value of the film as a teaching aid.

4. Focus. -- The entire picture should be sharp and clear.

5. Operation. -- Projectors should be simple to thread and easy to operate. All controls for operation should be conveniently located and the lamp house so constructed that bulbs may be changed easily and with little loss of time.

6. Protection for the Film. -- Devices designed to protect emulsion on the surface of the film from scratches, to prevent damage to the sprocket holes, and in other ways to check unnecessary wear and tear on the film, are desirable.

7. Mechanical Construction. -- A good projector, one mechanically well designed and constructed, should give years of uninterrupted service. An inferior machine not only gives poor service but also requires repairs. Replacement parts should be standardized and easily available at a reasonable cost.

8. Portability. -- The machine should be such that it can be moved easily from room to room. If it is heavy or unwieldy or difficult to set up, the teachers' use of it will be discouraged and handicapped.

9. Sound. -- The sound should be rich, clear, with good volume range and control. Volume should be loud enough for the largest room in which the machine will be used and quiet enough for the smallest.

10. Servicing. -- Even the best machines require some attention, and consequently it is well to consider the reliability of the company, and nearness to service centers. (40: 171-172)

It is the opinion of the writer that the well-equipped industrial arts classroom ought to have, in addition to a 16 mm. sound projector, a combination 2 x 2 slide and film strip projector and an opaque projector. It is desirable to have a machine that is well equipped to play the records which sometimes accompany the film strip, but if the budget will

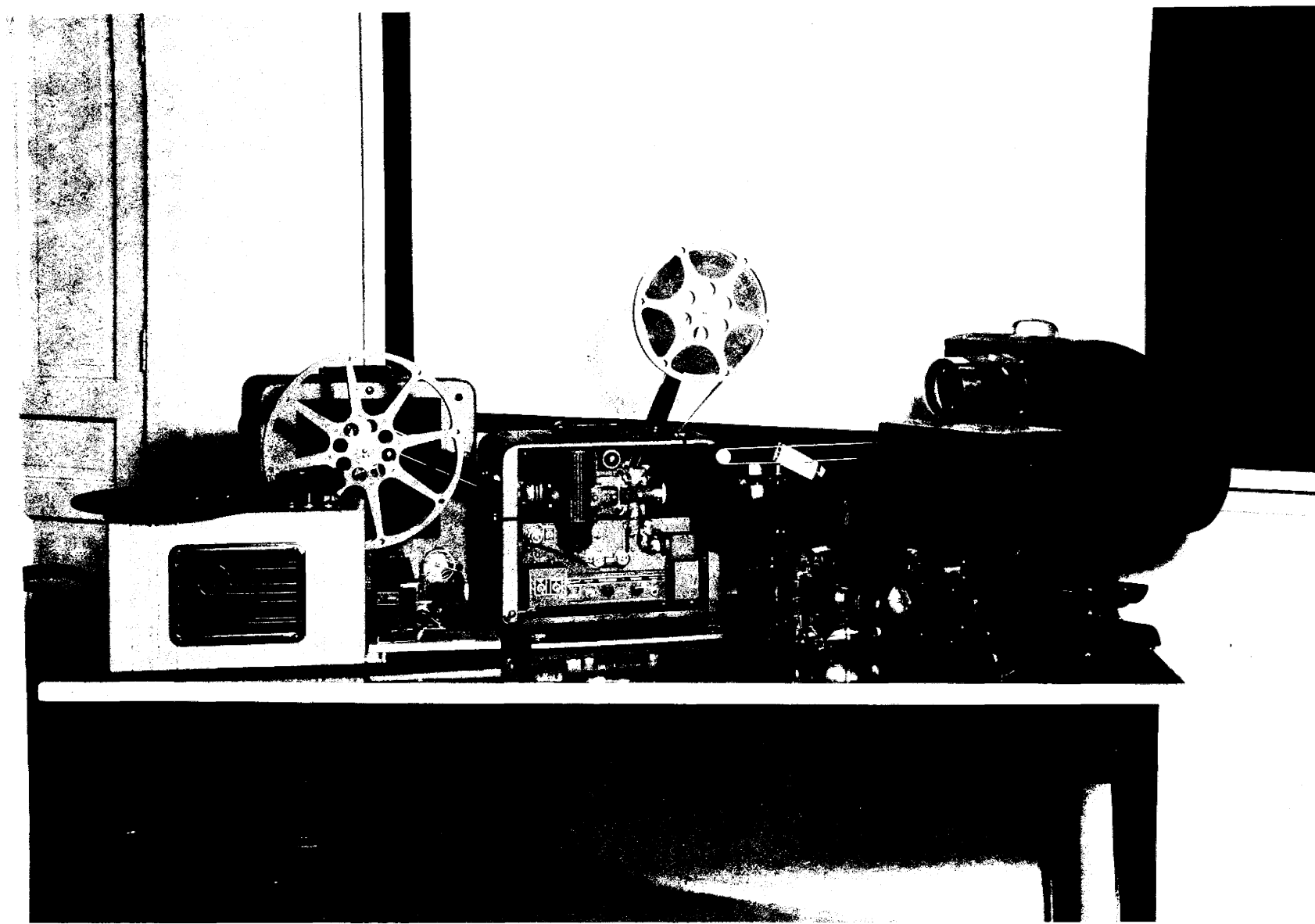


Plate 5-A. From left to right the projection machines pictured above are: The sound film strip projector, the 16 mm sound on film motion picture projector, the combination film strip and 2 x 2 slide projector, and the opaque projector.

not allow a separate machine of this kind, the resourceful industrial arts teachers will be able to "rig-up" some sort of record player to be used in conjunction with the regular film strip projector. For the projection of photographs or illustrations from textbooks or magazines, an opaque projector which accommodates a whole magazine page will be found to be much more satisfactory than the more usual type which will take nothing larger than 6 x 6 inches.

Sometimes one finds a school which has some projection equipment but no screen. There is no adequate substitute for a good projection screen. No matter how good the projector, it is not possible to show a good bright picture on a wall or sheet or some other surface that does not have good reflecting characteristics.

It is best not to make use of improvised screens unless such a screen is made of heavy canvas, first sized with glue or similar substance and then covered with a flat coating of white paint. If the teacher or manual training department can make such a screen, it should be mounted on a spring roller and enclosed in a wood or metal case so that dust may be kept out, then such a screen will serve school purposes. The screen should be large enough to make a picture of the size the teacher desires to use. It is probably best to secure a commercial screen of the proper size, hang it in the front of the room so that it can be unrolled or lowered for use when needed. Before purchasing, the teachers and school officials should see the different screens, test them in the classroom and secure information as to their life and utility from districts that have long used them. This in the end will prove a safe and satisfactory guiding principle. (32: 169)

In making a selection of a suitable projection screen, it is necessary to take into consideration the shape and seating arrangement of the room in which it is to be used. If it is necessary for some of the students to sit quite far

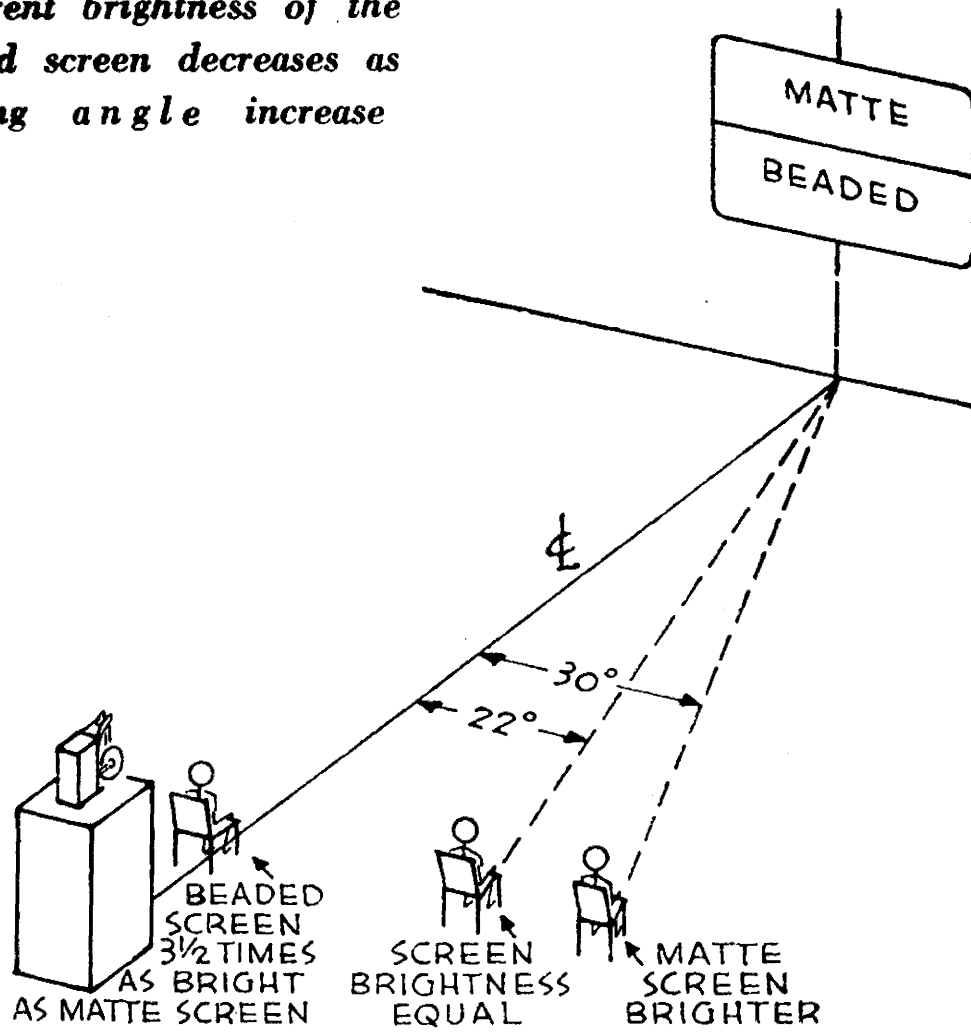
to one side of the axis of projection, a matte screen will be better than a beaded screen. Although the beaded screen is a much better reflector than the matte screen--and hence more efficient, requiring less wattage in the projector lamp --the angle from which it can be viewed is far narrower. The comparative characteristics of the two types of screens can be seen in the accompanying drawings. (Plates 6, 7)

The observer at the axis sees an image on the beaded screen about $3\frac{1}{2}$ times as bright as the one on the matte screen. To the observer viewing the screens at an angle of 22° , they appear equally bright. To the third observer whose viewing angle is 30° , the matte screen appears somewhat brighter. A viewing angle of less than 20° is therefore necessary to take advantage of the reflection characteristics of the beaded screen. (54: 79)

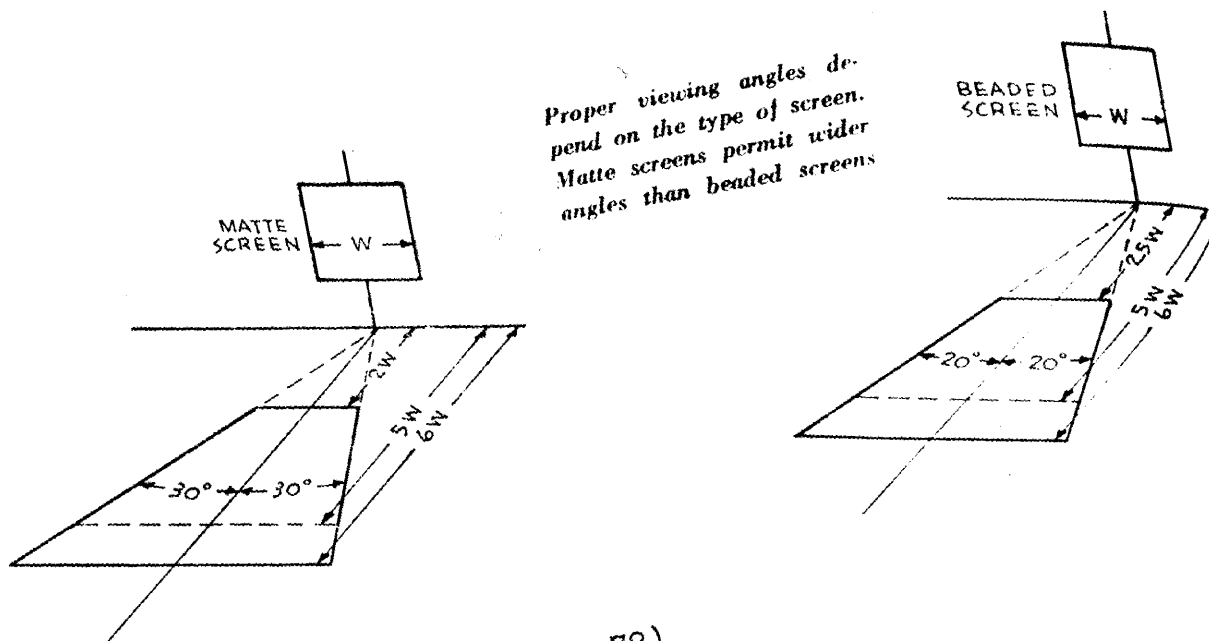
One other important consideration in classroom planning is that of providing adequate ventilation. When windows must be covered to darken the room, ventilation is impaired unless the room is ventilated by means of ventilation shafts or fans. A simple solution to the ventilation problem is the installation of a slow speed "squirrel cage" type blower to introduce fresh air into the room. The "squirrel cage" type is recommended because its slow speed makes it relatively silent.

If the industrial arts department is fortunate enough to have its own set of projection equipment, the room should be provided with storage cabinets at or near the same part of the room from which the pictures will be projected. When it is necessary to share the equipment with other departments of the school, the instructor should always procure what is needed for the day's lesson in advance and have the machine set up and ready to use before the class begins.

Apparent brightness of the beaded screen decreases as viewing angle increase



(54: 79)



(54: 78)

It cannot be too strongly urged that the classroom be provided with at least a combination strip and slide projector and, if possible, an opaque projector which can remain a permanent part of the classroom set-up. Without these facilities, "spot" use of illustrative material becomes impractical. On the other hand, if a "movie" is to be shown, the instructor has planned for its showing long in advance and can make arrangements for the use of the motion picture projector. For this reason, the motion picture projector can much better be shared by several departments than can the still picture equipment.

One of the most vexing problems confronting the teacher is: Where can appropriate training films be obtained? There are a good many excellent sources of films for projection. Any instructor can have a wealth of training films to draw from by securing one or more of the many catalogs distributed by the nation's film libraries.*

When some special instructional problem presents itself, for which no suitable training film can be found, the solution often lies in a homemade film, slide, or material to be projected by the opaque projector. Unless the teacher has a particular interest in photography, he may not choose to attempt a motion picture of his own, but any teacher can successfully produce his own slides, especially those of the non-photographic type. (A textbook on the preparation of visual aids will give detailed instructions for making both

*A list of training film catalogs can be found on page 104.

photographic and non-photographic slides, as well as helpful suggestions on the production of a school-made movie.) A good collection of material for use with the opaque projector is within the range of any teacher. All that is required in this regard is to keep a "look-out" for appropriate material in magazines, books, newspapers, etc., and index and file this material so that it will be available when it is needed.

Assuming that the classroom is well arranged and completely equipped and that the desired training films are available, the effective use of projected visual aids still necessitates following a plan of preparation and presentation. The instructor must be familiar with the operation of the equipment. A preview of the training films before showing to the class is a "must." In order to know the content of the film and determine what contribution it can make to the teaching, it is absolutely necessary that the teacher see the picture in advance. Without a preview it would be impossible to make an intelligent test, which is a very important step in the use of projected aids.

The trainee must be psychologically prepared before the training is presented. The problem that is to be solved should be stated in a few clear-cut simple sentences, and the trainee should be told how he will benefit by the showing of the film.

If the trainee realizes that his knowledge will be tested at the completion of the job problem, usually his interest will become more acute, his keenness of observation great, and his ability to learn more effective. (30:7)

A test of the students to determine the effectiveness of the

lesson actually does make the lesson more effective.

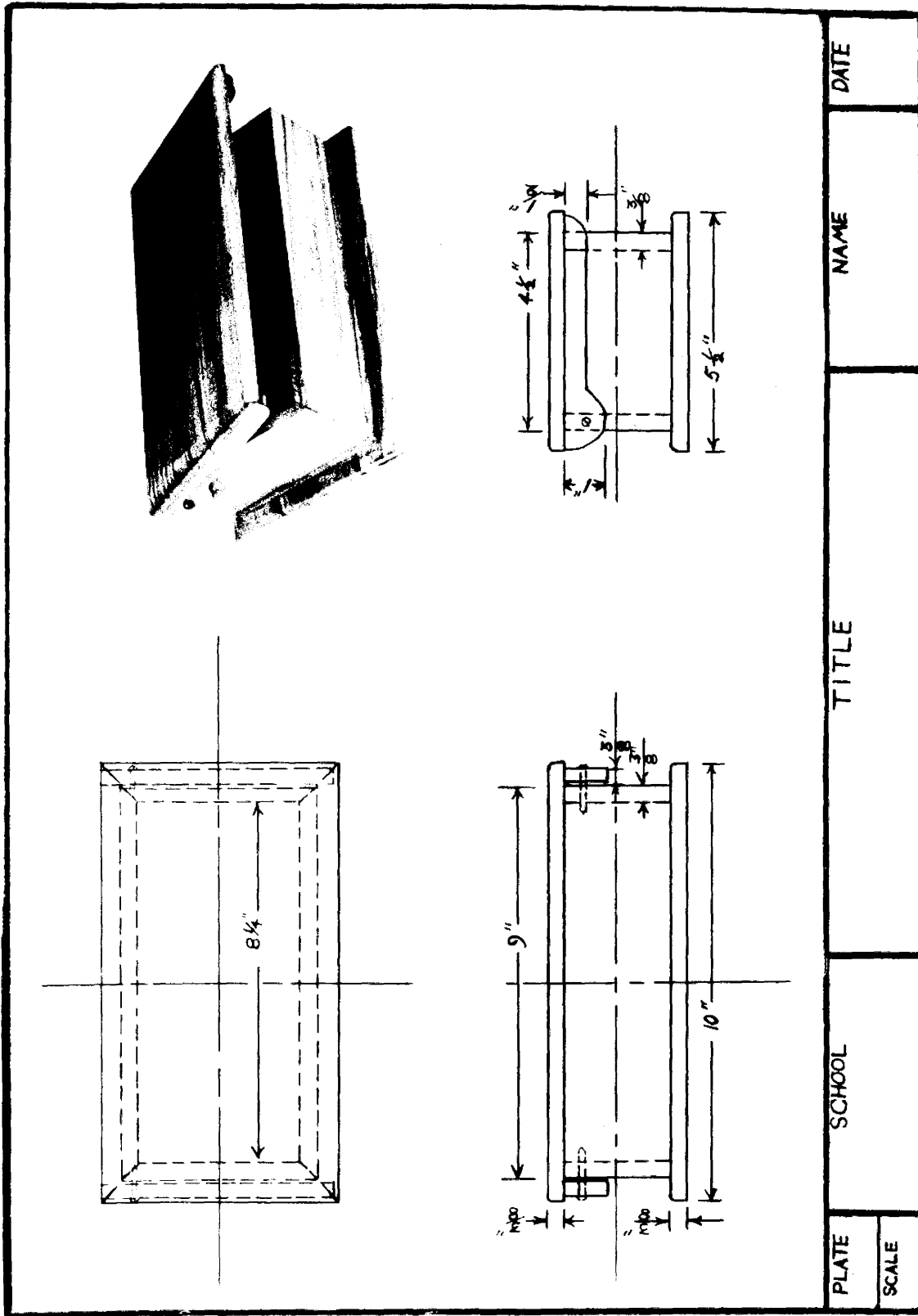
Diagrams are so integral a part of the teaching of industrial arts that one can scarcely conceive of a teacher trying to do without them. "Plans, drawings, blueprints, are the stock-in-trade of the teacher, who bends these methods to suit his own classroom needs." (21:427) Every job or project attempted by the industrial arts student must have some kind of plan for him to follow. Some jobs require only simple, easily understood plans or drawings, while others call for more complex drawings. If the students have had little previous practice in reading and interpreting blueprints or drawings, it may be difficult for them to visualize the job to be done from a drawing. If, however, the drawing were accompanied by a model, or by a pictorial view of the project, it would immediately become much more meaningful.

The writer has prepared a series of drawings which have in addition to the conventional top, side, and end views, a fourth view in the form of a photograph of the finished project. It is felt that this picture not only helps greatly in the interpretation of the drawing, but stimulates the student and makes him want to build the project. Plates 8 and 9 are examples of the above-mentioned drawings. This type of drawing is prepared by first making a photograph of the drawing and then taking a picture of the finished project. The two negatives are then used to make a composite print on a single piece of paper.

Among the many uses in the industrial arts shop for charts, tables, and diagrams, is the practice of posting

<div data-bbox="316 1312 568 1606"> </div> <div data-bbox="625 1291 1226 1606"> </div> <div data-bbox="625 661 1226 1018"> </div> <div data-bbox="300 367 868 703"> </div>		TITLE	NAME	DATE
PLATE	SCHOOL			
SCALE				

Plate 8

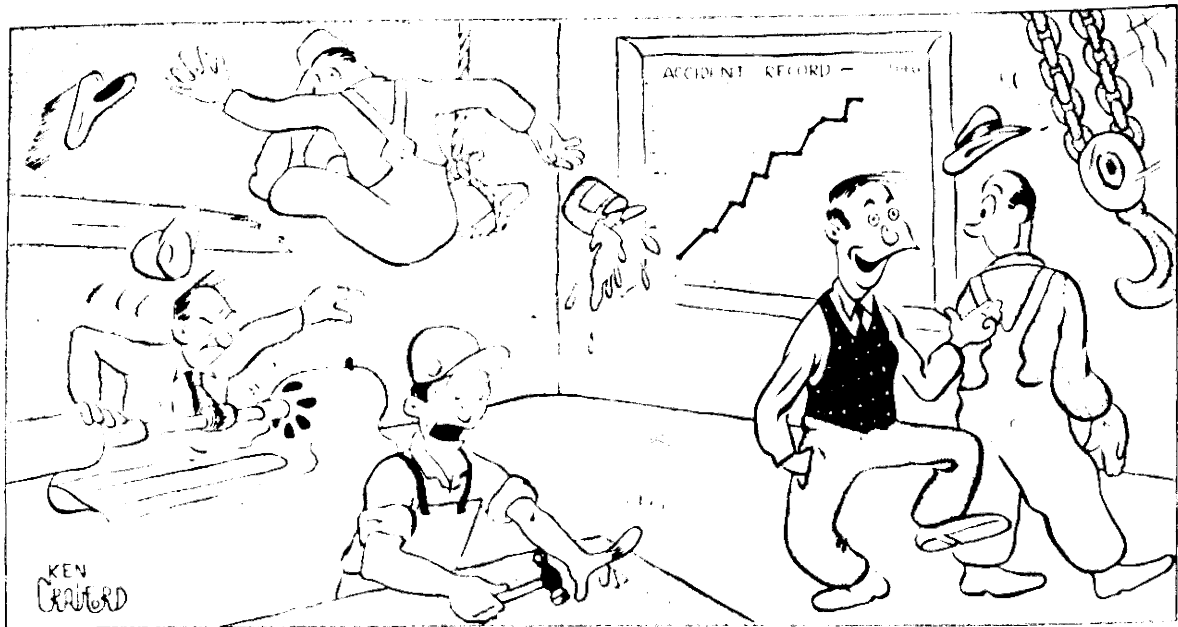


information charts in conspicuous places to which the students may refer. Such charts as the tap drill size chart, the decimal equivalent chart, and posters giving information on the operation of machines answer many questions for the students which would consume much of the teacher's time.

One of the problems facing the teacher of industrial arts is that of teaching the students safe practices around tools and machinery. Where the physical well-being of the students is in jeopardy as it is in the shop, it is wise to use the most effective means possible to keep the students on guard in order to avoid accidents. Safety can be taught the hard way (by letting accidents happen and letting the students observe the consequences of carelessness), but it is of course better to remind and warn the students constantly of the danger of accidents through the use of safety posters. These posters ought to be hung conspicuously, near the machines or areas to which they apply. Plates 11 and 12 are examples of one type of safety poster that might be employed.

Again the problem of a source of supply arises. A large number of good training posters, sets of project plans, blueprints, information charts, and drawings can be obtained from manufacturers of tools, equipment, and supplies, as well as from trade organizations and government agencies. Much of this material is distributed free of charge. A request for the material is usually all that is necessary, and many of these sources will include the name of the school on their mailing lists to receive new materials developed in the future. The following are a few of the companies from which teaching

Safety Can Be Taught the Hard Way Too!

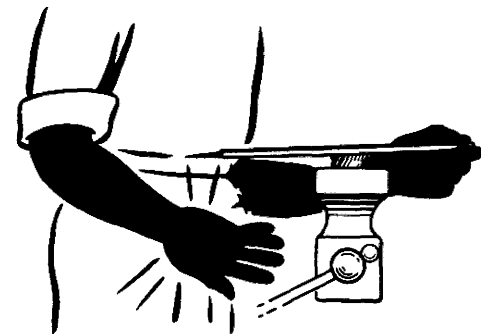
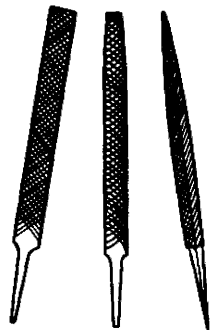


"We don't need a safety program, Boss; these boys are learning by experience."

STANLEY SAFETY CHART

STANLEY

STANLEY



**FILES
BEING USED . . .**

**WITHOUT
HANDLES . . .**

**MAY STAB
THE HAND.**

COPYRIGHT BY STANLEY TOOLS
NEW BRITAIN, CONN.

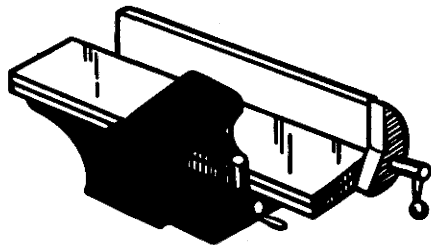
No. 19

STANLEY TOOLS
EDUCATIONAL DEPARTMENT
NEW BRITAIN, CONN., U. S. A.

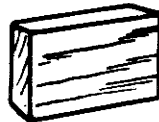
STANLEY SAFETY CHART

STANLEY

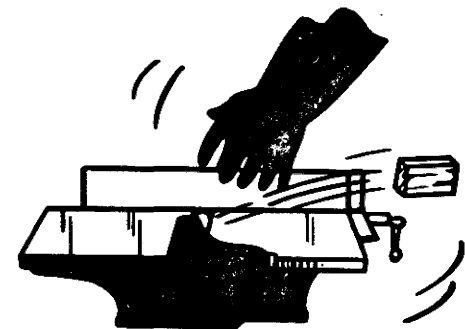
STANLEY



+



=



USING A
JOINTER . . .

FOR SMOOTHING
SMALL BLOCKS . . .

IS EXTREMELY
HAZARDOUS.

FROM SHEA AND WENGER'S
"WOODWORKING FOR EVERYBODY"
COPYRIGHT BY INTERNATIONAL TEXTBOOK CO.
SCRANTON, PA.

No. 21

STANLEY TOOLS
EDUCATIONAL DEPARTMENT
NEW BRITAIN, CONN., U. S. A.

LITHO IN U. S. A.

aids of this kind may be obtained: The Fredrick Post Company, 3650 South Avondale Avenue, Chicago, Illinois; Stanley Electric Tools, Educational Department, New Britain, Connecticut; The E. S. Starrett Company, Athol, Massachusetts; Henry Disston and Sons, 1238 Tacony, Philadelphia, Pennsylvania; Kearney and Trecher Corporation, Milwaukee, Wisconsin; and the South Bend Lathe Works, South Bend, Indiana. In addition to the above-mentioned firms, almost all of the companies who furnish equipment or materials for use in the industrial arts shops have educational departments and will prove good sources of visual teaching aids.

Because they are directly related to the specific topic or lesson to be taught, homemade posters are often the best. (30: 100-101) There is also considerable training value in letting students help to prepare posters or other teaching aids to be used in the classroom. "The student can render a service to the school and to himself by making a model or chart of the process he is studying." (36: 241)

In planning for the use of visual aids of the "visual symbol" type, it would be well to discuss the ways in which they can be most effectively used. If aids of this type are being used in the classroom as part of a specific lesson, the following five steps should prove to be helpful suggestions : (52: 440)

1. Those aids that will help to emphasize or illustrate points in the lesson should be selected. Many ideas can be illustrated by sketches drawn on wrapping paper with colored chalk or crayon.
2. Posters, graphs, or charts should be mounted where they will be useable to the class, but should be

covered so that they cannot be seen until needed. If charts are left exposed they distract the trainees' attention from other steps in the lesson.

3. In planning the lesson the proper time and place to introduce the aids should be considered.
4. During the lesson the instructor should display the aid at the right time and use a pointer to indicate location of parts or movement of current, gases, etc., always standing to one side of the chart and facing and talking to the class.
5. If trainees are encouraged to participate by taking the place of the instructor and going through the explanation as he has done, misconceptions can be cleared up or avoided.

In using these same training aids in the shop, they should be posted near the machines or area where the information is needed in order to be most useful. In the case of charts, such as the decimal equivalent chart, it is necessary for the teacher to see that the students understand their meaning and know how to make use of them.

When safety posters are displayed for long periods of time they lose their "punch." For this reason it is necessary to see that the safety poster is changed often enough to prevent its becoming stale and ineffective. The old poster should be replaced with another bearing the same warning but approached from a different angle.

The still picture is one of the most universally used visual aids in education. Among the many types of still pictures are: (1) photographs, (2) illustrations, (3) film strips, (4) slides, and (5) stereographs. (21: 221) Film strips and slides are, of course, projected aids, but even though they have been discussed briefly in another part of

this paper they cannot be omitted from a consideration of still pictures as a visual teaching aid. For many reasons the still picture is popular as an instructional aid: (1) it is real and vivid, (2) it is easily available, (3) it is convenient to use, (4) the expense of the still picture is low, and (5) it can be used repeatedly.

Flat or unprojected pictures are of various types. Photographs, illustrations, or sketches which may be handled by the students comprise one group. Wall and bulletin board pictures and textbook illustrations are the other type.

Photographs are, of course, a familiar and highly valuable type of visual material. They can be mounted or unmounted and may be clipped from a magazine, newspaper, or book. With the opaque projector such photographs can be projected for group study without removing them from the book or magazine.

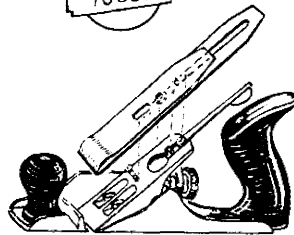
Illustrations are even more widely used in teaching. Under this heading we include every kind of pictorial representation of reality, from the artist's canvas, etching, lithograph, or color print to the drawings made by the pupil or illustrator to reconstruct some scene. Like the photograph, the illustration can be mounted or unmounted, and filed, and by means of the opaque projector, shown to the class.
(21: 221)

Sketches are most commonly used by the teacher in the classroom to clarify some point in the lesson, the sketch being made on the blackboard. It is, of course, necessary for the teacher to train himself in the technique of sketching so that his blackboard illustrations will be effective in making his lecture more meaningful.

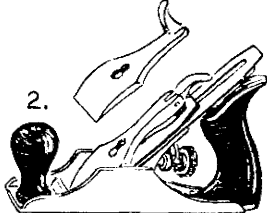
There are many sources from which pictures may be obtained easily and with little expense. They can be taken from

HOW TO SET THE STANLEY PLANE

STANLEY
TOOLS

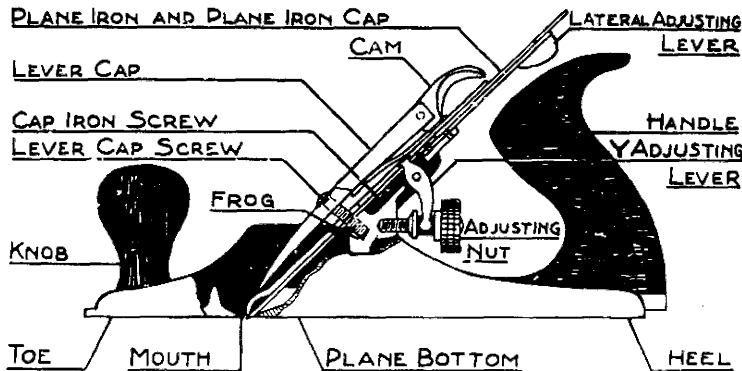


TO PUT THE PLANE TOGETHER LAY THE PLANE IRON, BEVEL SIDE DOWN, ON THE FROG. BE SURE THE ROLLER ON THE LATERAL ADJUSTING LEVER, THE END OF THE YADJUSTING LEVER AND THE HEAD OF THE PLANE IRON CAP SCREW ARE CORRECTLY SEATED

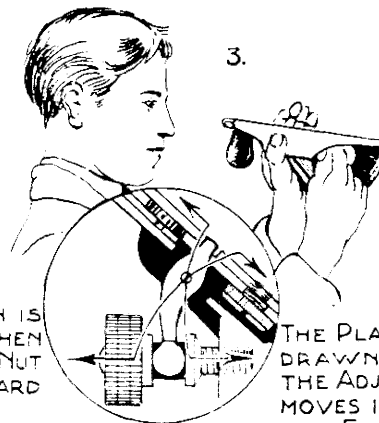


SLIP THE LEVER CAP UNDER THE LEVER CAP SCREW AND PRESS DOWN THE CAM. IF THE PLANE IRON IS IN THE CORRECT POSITION THE CAM WILL EASILY SNAP IN PLACE. IF THE CAM WILL NOT SNAP IN PLACE EASILY, SLIGHTLY LOOSEN THE LEVER CAP SCREW. IF THE PLANE IRON IS NOT FIRMLY HELD WHEN THE CAM IS IN PLACE SLIGHTLY TIGHTEN THE LEVER CAP SCREW.

STANLEY TOOLS
NEW BRITAIN, CONN. U.S.A.



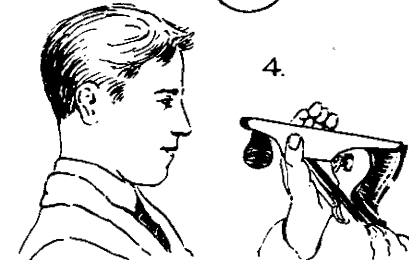
TO ADJUST FOR THE THICKNESS OF THE SHAVING SIGHT ALONG THE BOTTOM OF THE PLANE AND TURN THE ADJUSTING NUT UNTIL THE CUTTING EDGE PROJECTS ABOUT THE THICKNESS OF A HAIR.



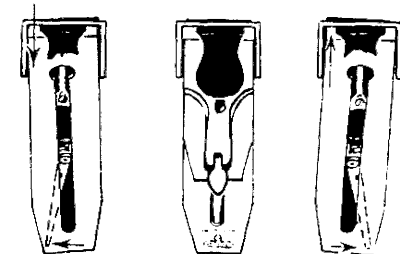
THE PLANE IRON IS PUSHED OUT WHEN THE ADJUSTING NUT MOVES OUT TOWARD THE HANDLE.

THE PLANE IRON IS DRAWN IN WHEN THE ADJUSTING NUT MOVES IN TOWARD THE FROG.

STANLEY
TOOLS



TO ADJUST FOR THE EVENNESS OF THE SHAVING SIGHT ALONG THE BOTTOM OF THE PLANE AND MOVE THE LATERAL ADJUSTING LEVER TOWARD THE RIGHT OR THE LEFT.



KNOB, LEVER CAP AND PLANE IRON CAP REMOVED TO SHOW THE ACTION OF THE LATERAL ADJUSTING LEVER.

EDUCATIONAL DEPARTMENT
CHART NO. C115

Plate 13

PRINTED IN U.S.A.

Training charts such as this and the one reproduced in plate 14 are available from the Stanley Tool Company. The price is \$2.50 for 18 charts printed on both sides. (36 in all)

HOW TO USE THE STANLEY FLAT COLD CHISEL

STANLEY
TOOLS



TO CHIP A BROAD SURFACE, THAT IS, TO REMOVE THE SURPLUS MATERIAL PREPARATORY TO SMOOTHING WITH A FILE, USE A CAPE AND A FLAT CHISEL. CHIP GROOVES ACROSS THE SURFACE OF THE WORK WITH A CAPE CHISEL (SEE STANLEY CHART NO. 54) THEN CHIP AWAY THE MATERIAL BETWEEN THE GROOVES WITH A FLAT CHISEL. HOLD THE WORK IN THE VISE AT ABOUT ELBOW HEIGHT GRASP THE CHISEL FIRMLY ENOUGH TO GUIDE IT, BUT LOOSELY ENOUGH TO EASE THE SHOCK OF THE HAMMER BLOWS IMPARTED TO THE HAND THRU THE CHISEL.

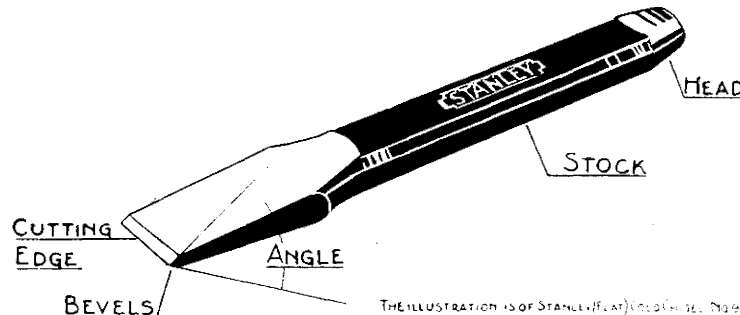
HOLD THE CHISEL AT AN ANGLE THAT WILL BRING THE LOWER BEVEL PARALLEL TO THE SURFACE OF THE WORK.

GRASP THE HAMMER NEAR THE END OF THE HANDLE AND SWING IT WELL OVER THE SHOULDER IN A FREE GRACEFUL SWEEP.

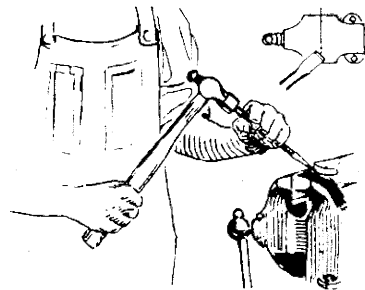
IT IS NOT NECESSARY TO LUBRICATE THE CHISEL WHEN CHIPPING CAST IRON WHEN CHIPPING WROUGHT IRON OR STEEL, LUBRICATE THE CHISEL EVERY FEW BLOWS BY TOUCHING THE EDGE TO A PIECE OF OIL SOAKED WASTE.

STANLEY TOOLS
NEW BRITAIN CONN. U.S.A.

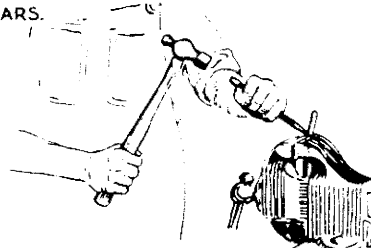
COPYRIGHT 1933



THE ILLUSTRATION IS OF STANLEY FLAT COLD CHISEL, NO. 99-1/2.



TO SHEAR IN A VISE, HOLD THE CHISEL SO THAT WHEN STRUCK WITH THE HAMMER, THE CHISEL AND THE STATIONARY JAW OF THE VISE ACT LIKE A PAIR OF SHEARS.



TO CUT ROD OR SMALL BAR STOCK TO ROUGH SIZE, NICK IT ON OPPOSITE SIDES AND BEND IT UNTIL IT BREAKS.

STANLEY
TOOLS



TO CUT OUT A HOLE, USE A NARROW CHISEL SO THE SHAPE OF THE CUT WILL CONFORM CLOSELY TO THE LINE, REDUCING THE AMOUNT OF FILING NECESSARY FOR FINISHING.



COLD CHISELS ARE GRIND OR FILED WITH A BEVEL ON BOTH SIDES, FORMING A CUTTING ANGLE OF ABOUT 65° FOR AVERAGE WORK.

COLD CHISELS ARE USUALLY MADE OF CARBON TOOL STEEL. CHISEL NO. 99 IS MADE OF CHROME VANADIUM ALLOY STEEL, TOUGH ENOUGH TO GIVE HARD LASTING USE, BUT SOFT ENOUGH TO FILE SHARP, THUS AVOIDING THE DANGER OF BURNING THE EDGE WHEN GRINDING.

TO AVOID ACCIDENTS

KEEP THE HEAD OF THE CHISEL AND THE FACE OF THE HAMMER CLEAN AND FREE FROM OIL. LET THE GRIP OF THE THUMB AND FORE FINGER BE LOOSE ENOUGH TO GIVE, IF THE HAMMER SHOULD SLIP AND HIT THEM. IN USE, THE HEAD OF THE CHISEL BECOMES TURNED OVER OR BURRED. KEEP THE BURR GROUND AWAY, TO PREVENT INJURY TO THE HANDS AND TO PREVENT PARTICLES OF THE BURR FROM FLYING OFF INTO YOUR EYES. USE GOGGLES TO PROTECT YOUR EYES WHEN CHIPPING.

EDUCATIONAL DEPARTMENT
CHART NO. C53
BY R. O. REGER

Plate 14

The charts in this series include instructions on the use of most of the tools manufactured by the Stanley Tool Company.

publications of all sorts, and the resourceful teacher keeps his eyes open for suitable pictures to illustrate his lessons. Frequently good material can be obtained from the industrial houses furnishing materials and equipment to the school. The same sources from which motion pictures are obtained can often furnish still pictures in the form of slides and film strips. These "still" training films are listed in the same catalogs as the motion pictures. (A partial list of sources of still pictures will be found in the appendix, page 53.)

Selecting good pictures and preparing them for classroom work are useless gestures unless the pictures are used effectively. The still picture has certain potentialities and applications as a teaching aid which must be recognized by the teacher in order for him to make effective use of it. Merely letting the students look at the picture seldom constitutes effective utilization. "A picture leaves much to the imagination. In short, it must be very definitely and intelligently 'taught' if it is to be correctly interpreted, understood, and correlated by the pupil." (40: 115) Because of the danger of wrong interpretation on the part of the student, it is very important that the teacher explain each picture carefully, calling the attention of the class to the significant parts. Another important consideration in making the picture an effective teaching aid is the element of size. Pictures must be large enough for all of the students to see clearly. If large pictures are not available and small ones must be used, enough copies should be provided to give all class members a chance to study them. A small picture can, of course, always be

projected with the opaque projector to enlarge it to a point where the whole class can see it.

In teaching skills the demonstration will be used often. It is probably the best single method of teaching anyone to work with his hands. "This procedure of teaching through guided performance will be followed at many points in industrial arts and vocational training."

One question will, however, occur to the teacher of these subjects: Should he make use of additional audio-visual media? Should he follow a demonstration with a film demonstration? Should he use charts with his demonstration? Should he require the students to demonstrate skills to one another? There is no blanket answer to such questions other than the general principle: that one must experiment to find the best combinations of audio-visual methods. (21: 420)

If it is at all possible, it is well to have the demonstration made in the classroom where all students can see well and where there will be no distracting noises such as would be the case if the demonstration were made in the shop. In order to present the demonstration in the classroom it is necessary that the room be equipped with a workbench and whatever other equipment, machines, and tools are necessary to demonstrate the skill to be taught. Nothing kills the interest of the students as much as the interruptions and delays brought about when the teacher has to stop the demonstration to chase after some tool or piece of equipment in order to continue. A well planned and equipped classroom will obviate this situation. When the demonstration is presented in the classroom, models and mock-ups are often more easily and effectively used than the real thing. For example, a cut-away model of a gasoline engine in which the students could see all of the parts in

their correct relationship to the complete engine would not only be easier to use in the classroom, but it would make it possible for the students to observe functions that cannot be seen in the ordinary engine.

The value of mock-ups as a teaching aid is emphasized by the fact that the use of visual aids and mock-ups is considered to be almost entirely responsible for the success of army teaching methods. (50: 362)

Some common examples of models and mock-ups that may be used in the teaching of industrial arts : (21: 421)

1. A model of a plumbing installation. It duplicated the real thing and the student can get a clear-cut picture of what the final job will look like.
2. A working model of a single-plate clutch. It is made of wood and fitted with springs. When the clutch pedal is depressed the operation is clearly demonstrated.
3. An auto crankshaft made of wood. It is small and light enough to pick up and handle.
4. A cross-section model of an aircraft engine.
5. An enlarged working model of a kilowatt-hour meter--a duplicate of the ordinary meter, but larger and arranged so as to be worked by the student.
6. An enlarged model of distributor points on a gasoline engine. Anyone who sees this can quickly learn what is meant when the mechanic says the distributor points are worn.
7. A cut-away working model of an auto magneto system.
8. A cross-section working model of a four-cycle engine, operated by a hand crank, and using an electric bulb to represent the spark.
9. Telephone apparatus--a device for showing the action of a telephone transmitter and receiver, mounted on a board.

10. A lamp resistance board used in demonstrating the reduction of electric current by increasing the resistance.

One who has visited the Museum of Science and Industry in Jackson Park in Chicago, does not need to be told about the vast teaching possibilities of the exhibit in industrial arts. This museum is filled with fascinating exhibits depicting the evolution and advancement of industry and ranging from a real working model of a coal mine with its elevator on which visitors are lowered down into the mine to see the real full size mining equipment in operation, to a fine exhibit of the craftsmanship of the watch making industry. Many of the exhibits are working models illustrating some of the principles of the physical sciences and can be operated by the spectators. It makes no difference which day one visits this wonderful museum, he will always find throngs of interested people crowding around the various exhibits--a testimony to the amount of interest a well-planned exhibit will generate.

Of course teachers cannot duplicate the exhibits of the Museum of Science and Industry, but they can take advantage of the interest-getting qualities of the exhibit to improve their teaching. If the student's interest can be aroused, nothing can stop him from learning. Several of the interesting exhibits found in museums could be reproduced in the school shop without a great deal of work. For example, if a cut-away model of an engine has been prepared for classroom use, it would be a simple matter to arrange to turn it at slow speed with an electric motor and gear or belt drive so that students could watch the function of the different parts in relation to each

other. Then if small electric lamps were connected in the ignition system in place of the spark plugs, the students would be able to identify the four different strokes of the four-stroke cycle.

Another valuable use of the exhibit is the improvement of public relations for the school, and in the case of the industrial arts teacher, for the industrial arts department. An exhibit of student projects displayed in the window of a "downtown" store gives the public a chance to see what is being done by the school and by the department, and thus encourages cooperation from parents and townspeople. Displays of this kind have a dual purpose by also providing added incentive for the students to do good work in order to have their projects merit exhibition.

When the exhibit is used to show examples of good workmanship for other students to pattern after, it is important that only those jobs that are real "models"--perfect in all details--be exhibited, so that errors will not be set up as examples for future students to follow.

Probably the best source of exhibits is the school-made display. If the exhibit is prepared by the teacher and the students, the real needs of the class are best served.

A valuable project for every school that teaches industrial arts and vocational education is offered by the exhibit idea elaborated into a School Museum of Industry. Over a series of semesters the school can produce a wide variety of exhibits valuable for everyone in the school population, and particularly valuable for students in industrial arts and vocational education. It can be used for social studies classes, in particular. The very fact that the elaborate museums such as the one at Rockefeller Center, are

so difficult of access makes it more desirable for schools to make museums of their own. Such a school project will have great value in attracting members of the community to the school to 'look and learn'." (21: 424)

There are many fine exhibits available from industrial concerns which can often be had without expense to the school. The L. S. Starrett Company has prepared some fine exhibits of precision measuring tools for school use. U. S. Steel and Brown and Sharpe are others from whom fine displays have been obtained by some schools.*

The field trip is a potent and popular visual aid which the instructor would do well to take full advantage of. A better appreciation of the problems of industry can be obtained through an actual visit to an industrial plant than could be had through any vicarious experience.

A survey of the community will reveal the manufacturing plants, machine shops, power generating plants, or construction jobs where an outstanding job is being done in the particular phase of industry the class is engaged in studying. In most cases the managers or owners of these businesses will grant permission for a field trip into their establishments.

In order to make the most of a field trip as a training aid, it is necessary to plan carefully each step. The success of any field trip will be in direct ratio to the amount of planning that has preceded it. Although every field trip will have its own problems, the following suggestions will be found to be applicable in most training situations: (30: 169)

*The Utah State Agricultural College Division of Technology has displays from each of these companies.

1. The specific aims of the trip must first be determined.
2. A business or plant which does the type of work which will satisfy the aims of the trip must be selected.
3. Permission to make the trip must be obtained from the proper authorities, and a check of all institutional regulations must be made.
4. Arrangements as to date, time, number of trainees, number of company guides, and the objectives of the trip must be made with the company manager or executive.
5. The preparation of guide sheets for each trainee will help to make the field trip a success.
6. The instructor should visit the training agency and become familiar with the itinerary before taking the actual trip.
7. The location of rest rooms and eating facilities should be familiar to the instructor.
8. A check of transportation facilities must be made.
9. Specific directions about where to meet and provision for transportation must be arranged.
10. A maximum of ten trainees is all that one guide can handle well.
11. Each trainee must be instructed about what to observe.
12. Punctuality, arrival and departure at the set time, keeps interest from lagging.

The trainee should be prepared by the instructor before the field trip is undertaken. Because the field trip is such a potent visual aid, it is easy to arouse the interest of the students. However, the instructor should be careful to point out the things to be observed on the trip and to explain how the knowledge gained through these observations will help the students. If the trainees are told that they will be expected to pass an examination on what they are expected to learn while

on the trip, they will have an added incentive to pay close attention to all details.

To make certain that all of the important points are covered, the guide should be provided with a copy of the guide sheet prepared for the students. It would be well to check through this guide sheet with the person who is going to act as guide on the trip several days before the trip. If the instructor plans to make the same field trip with another class at some future time, he will do well to make notes to be filed, together with guide sheets and other material, for use at some later date.

Each field trip should be followed up as soon as possible with trainee application, discussion, and further study. If the trip was of the type that gave the trainee a chance to "try his hand" on the job, a chance should be provided for him to get more practice. The test that was mentioned to the students before the trip should be administered as soon as possible after the trip, but probably not until the class has had a chance to discuss and clarify the weak points. Any erroneous ideas revealed by the test should be corrected immediately so that the students will not be left with some false impressions. In clearing up mistaken ideas and in the general discussion of the trip, motion pictures or slides or any material that is on file should be utilized if they will help in the review of the problem. (30: 172-174)

A great deal of study and research has gone into production of facilities and materials for use in the audio-visual method of teaching. There are available to the teacher in

today's schools many and varied audio-visual teaching materials --as many and in as great a variety as he might choose to use. Numerous textbooks on the preparation and use of visual aids are available. Visual education equipment is highly developed and priced within reach of most school systems. Training films, slides, charts, diagrams, and exhibits can be had at low cost and sometimes without cost. Some of these training aids have been prepared under the direction of experienced educators and embody all of the features of good pedagogy. Their use enables the teacher to put his lesson over better than he could possibly do without them.

It is up to the modern progressive teacher to take advantage of the facilities that are available to him, and of the research that has been done, and thus enrich his teaching through the use of audio-visual aids.

SOURCES OF MOTION PICTURE FILM CATALOGS (30: 2)

1. Directories of 16 mm. Motion Picture Film Sources, Bell and Howell Company, 1801-1815 Larchmont Avenue, Chicago, Ill.
 - (a) Agriculture Directory, price--25¢
 - (b) Geography, Travel, and Natural Resources Films, price--25¢
 - (c) Medical and Dental Catalogue, price--50¢
 - (d) Religious Film Sources, price--10¢
2. Directory of Film Sources, Victor Animatograph, Davenport, Iowa, price--50¢.
3. General Electric Motion Pictures, Visual Instruction Section, General Electric Company, Schenectady, N.Y.
4. General Motors Film Catalogue, General Motors Corporation, 1775 Broadway, New York, N.Y.
5. U. S. Government Film Directory, U. S. Office of Education, Federal Security Agency, Washington, D. C.
6. U. S. Steel Corporation, Subsidiaries Film Catalogue, U. S. Steel Corporation Subsidiaries, 208 South LaSalle Street, Chicago, Ill.
7. Visual Aids for Retail Training, Harry Q. Packer, Middlesex County Retail Training Bureau, Woodbridge, N. J., price--\$1.00.
8. Educational Film Catalog, H. W. Wilson Company, 950 University Avenue, New York, N.Y., price--\$2.00.
9. 1,000 and One--The Blue Book of Nontheatrical Films, Educational Screen, 64 East Lake Street, Chicago, Illinois, price--\$1.00.
10. Educator's Guide to Free Films, Educational Progress League, Randolph, Wisconsin, price--\$3.00.

SOURCES OF STRIPFILM AND SLIDEFILM (30: 22)

1. Visual Training Aids, Castle Films, Distributor Corporation.

(a) 30 Rockefeller Plaza, New York 20, N. Y.

(b) Field Building, Chicago 3, Ill.

(c) Russ Building, San Francisco 4, Calif.

This catalogue contains a complete list of the training material produced by the United States Office of Education, United State Department of Agriculture, War Department, and Navy Department. It may be obtained free of charge by contacting the nearest office.

2. Slidefilm and Motion Pictures to Help Instructors, The Jam Handy Organization, 2900 East Grand Boulevard, Detroit 11, Mich. (Free of charge.)

3. Picturol Catalogue, Society for Visual Education, Inc., 100 East Ohio Street, Chicago 11, Ill. (Free of charge.)

4. Stillfilm Catalogue, Stillfilm, Inc., 8443 Melrose Avenue, Hollywood 46, Calif. (Free of charge.)

5. An Index of Educational and Visual Training, Westinghouse Electric and Manufacturing Company Central District, 306 Fourth Avenue, Pittsburgh, Pa. (Free of charge.)

6. Sources of Visual Aids for Retail Training, Harry Q. Packer, Middlesex County Retail Training Bureau, Woodbridge, N. J. (Price--\$1.00.)

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5. Anonymous. "Walt Disney: Great Teacher." Fortune 26: 90-95+. August 1942.
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